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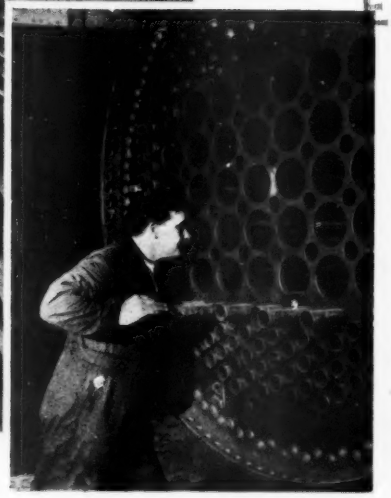

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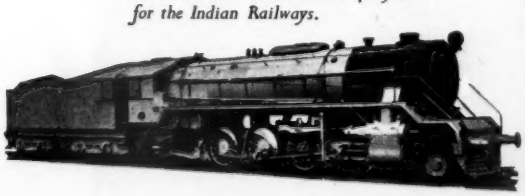

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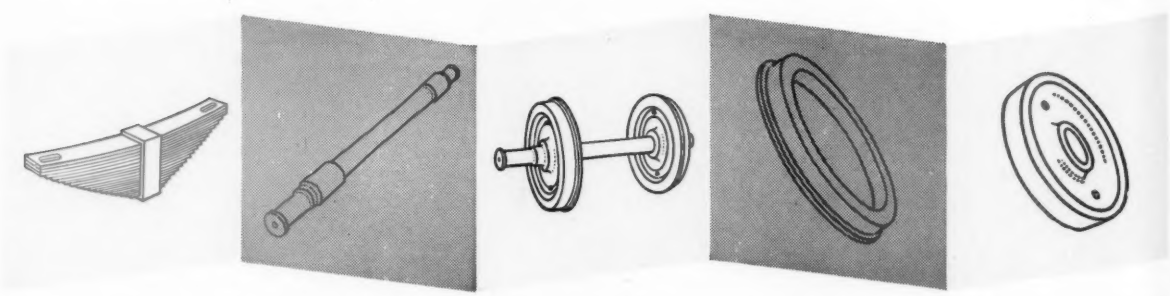

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CONTENTS

	PAGE
Editorial Notes	61
Transport After the Recess	63
Forthcoming Combustion Engine Congress	63
Tasmanian Government Railways in 1954-55	64
Record Results in Nigeria	64
British Transport Commission Traffic Receipts	65
Electric and Diesel Traction: A Danish Survey	66
The Scrap Heap	67
Overseas Railway Affairs	68
Publications Received	69
Aluminium Coach Doors for British Railways	70
Rubber in Railway Engineering	71
Electric Traction Section	73
Progress on the Cape Midland Main Line	80
Personal	81
New Equipment and Processes	84
News Articles	86
Contracts and Tenders	87
Notes and News	89
Railway Stock Market and Official Notices	92

A New Prime Minister and Cabinet

THE resignation of Sir Anthony Eden from the office of Prime Minister last week, because of grave ill-health, has been regretted as sincerely as was the unfortunate controversy, of which he was the centre, over the Suez affair. He succeeded Sir Winston Churchill as recently as April, 1955. His keenest critics must sympathise with him in his need to relinquish his high office after so brief a tenure and after so long and arduous an apprenticeship. The new Prime Minister, Mr. Harold Macmillan, formerly Chancellor of the Exchequer, has formed a new Cabinet, which, while it retains many of the former Ministers, is yet given further strengthening towards the financial and economic problems of the day. The new Chancellor of the Exchequer is Mr. Peter Thorneycroft, whose term of office at the Board of Trade has been so successful ; there he is succeeded by Sir David Eccles. The Earl of Home and Mr. Alan Lennox-Boyd retain their portfolios as Secretaries for Commonwealth Relations and the Colonies respectively, and Mr. Iain Macleod is still Minister of Labour. It is gratifying that the Minister of Transport & Civil Aviation, Mr. Harold Watkinson, is to have a seat in the new Cabinet, a recognition, as welcome as it is belated, of the importance of transport in the national economy. Mr. Macmillan will be well aware of this factor, for it is a subject on which he must have gained both knowledge and experience during and since his association with the former Great Western Railway Company, of which he was a director. A new department, the Ministry of Power, has been created and will have at its head Sir Percy Mills, an industrialist of wide experience. This office, besides taking over the functions of the old Ministry of Fuel & Power, will assume responsibility for steel (formerly within the province of the Board of Trade). The inclusion of the Ministries of Power and Transport in the Cabinet shows the importance which the new Prime Minister attaches to the expansion and development of the basic materials and services in the interests of efficient British industry.

A.S.L.E.F. Wage Settlement

THE acceptance by the delegate conference of the Associated Society of Locomotive Engineers & Firemen on January 9 of the Railway Staff National Tribunal award of a 3 per cent wage increase seems to have resulted from a wish to consolidate existing gains rather than from satisfaction at the award. The conference also approved a recommendation by the A.S.L.E.F. executive that a new claim should be submitted as soon as the Society executive feels that course to be justified. The award, already accepted by the British Transport Commission, will cost some £1,500,000 a year. The A.S.L.E.F. claim was for a 15 per cent increase, but the National Union of Railwaymen, which recently rejected an offer by the Commission of 3 per cent, asked for 10 per cent and is putting its case to the Railway Staff National Council today (January 18). The Transport Salaried Staffs' Association submitted its pay proposals at a meeting of the Railway Staff Joint Council on January 10. A sliding scale linked to rises in the cost of living is suggested with the unusual feature that the scale should slide upwards only and remain static when prices fall. The Commission is considering the matter and will reply to the T.S.S.A. at a date to be announced later.

Transport Opportunities for Youth

THE opportunity taken by the British Transport Commission last week, at the annual conference of the Public Schools Appointments Bureau, to bring home to headmasters and careers masters of public schools the attractive future for young men now entering the service of British Railways is the latest manifestation of the intensive drive for suitable recruits to the railway service now being carried on by the Commission. As Mr. W. P. Allen, Manpower Adviser to the Commission, told the conference, " those who enter British Railways now will have the opportunity of helping to build the new modern railway and then operate it." His assurance that the work is full of excitement and promise, which, for young men of the right type it certainly is, should go far to convince public school masters that in recommending a pupil to enter the railway service they are setting them on the path to a technical or managerial career of which they, and the country, may be proud in the years to come.

Advisory Committee on Traffic Flows

THE national advisory committee which has been set up by the Ministry of Transport & Civil Aviation with Mr. G. Stedman, Deputy Secretary at the Ministry, as Chairman, is to watch changes in the pattern of goods transport during the period of petrol and oil restrictions and to relate these to the rationing system. Some of these changes are already apparent, though probably not yet as marked as they will become in a few weeks. If allowance is made for the former steady fall in railway merchandise traffic, the Ministry estimate last week that some 5 per cent of goods normally moved by road are now being carried by rail is probably close to the truth. The British Trans-

port Commission is represented on the committee, which also includes representatives of the coastal shipping industry, the Road Haulage Association, the Traders' Road Transport Association, the National Conference of Road Transport Clearing Houses and trade unions. No comparable committee is thought necessary for road passenger transport. The issue of supplementary fuel rations to road transport operators is now entering the final stage and it should soon be possible to compute with some certainty the amount of extra traffic which will find its way to British Railways.

Overseas Railway Traffics

MIDLAND Railway of Western Australia estimated railway and road service receipts for October, 1956, were £A92,432 against £A72,785 for October of the preceding year; the aggregate for the four months July-October was £A347,457, compared with £A300,767 for the corresponding period of 1955. Salvador Railway Company receipts for October last were colones 184,000, against colones 148,000 the previous year; the aggregates for the four months July-October of 1956 and 1955 were respectively colones 704,000 and 577,000. South African Railways & Harbours weekly total railway receipts showed little variation during November and early December, and generally were a little above the corresponding 1955 totals. The latest available figures, for the week ended December 8, show total railway receipts of £2,831,000 (£2,725,000), of which passenger receipts amounted to £494,000 (£416,000), goods £1,781,000 (£1,757,000), coal £243,000 (£243,000), parcels and mails £110,000 (£117,000), livestock £43,000 (£43,000), and "rents, etc., and miscellaneous" £160,000 (£148,000). Aggregate railway receipts from April 1 to December 1, 1956, were £93,281,000 compared with £93,055,000 for the corresponding eight months of 1955; the totals under the several headings showed close similarity between the two years.

Monorail for Brazil

THE contract, valued at £55,000,000, reported to have been awarded to the Alweg Monorail Corporation (Bahamas) for the rebuilding of the public transport system of Sao Paulo on the Alweg system, marks the first success of the several monorail systems which have been devised in Britain, Europe, and America since the war. Preliminary reports indicate that the work will include the building of 124 stations, 31 miles of elevated railways, 24 miles of surface lines, and some 1½ miles of line in tunnel. The present Sao Paulo city transport is quite inadequate to deal with the rapidly expanding population of the city and a committee has been preparing plans for the last two years for an improved system. Trials of the Alweg system have been in progress near Cologne for more than four years under the sponsorship of the Swedish industrialist, Dr. Axel Wenner-Gren. A reduced-scale three-car train working on a closed circuit is said to have attained 180 m.p.h. The Alweg trains run on a track laid on a massive concrete beam with the sides of the coaches overhanging the sides of the beam to give stability. The principle is much the same as that of the high-speed electric railway between Liverpool and Manchester proposed by Behr more than 50 years ago.

Accidents in 1955

THE annual report for 1955 of the Chief Inspecting Officer of Railways, Lt.-Colonel G. R. S. Wilson, a more extended notice of which will appear in our pages shortly, shows that "train" accidents decreased by 3·4 per cent compared with 1954, but that the resultant casualties were more numerous. In that year no passenger lost his life in such an accident, whereas in 1955, 40 did so. Of these deaths, 36 occurred in three accidents: the serious derailments at Sutton Coldfield and near Didcot, and the collision at Barnes accompanied by a fire started by electrical arcing. It proved necessary to hold 18 formal inquiries into this class of accident against eight in the previous year. Failure of operating staff accounted for a little over half the cases, train crews being responsible for 204 collisions and derailments and signalmen for 38. Some 12 per cent were attributable to technical defects, with which human failure frequently was associated, but there was a decline in cases due to other causes. The report observes that in seven instances serious indiscipline was revealed at the inquiry, while misconduct on the part of the public was responsible for no fewer than 48 collisions with vehicles at level crossings. Only one passenger, however, was killed for 38 million passenger journeys; and fatalities, by whomsoever suffered, were 0·7 per million train miles for all movement of any kind on rail against 0·5 in 1954.

Railway Competition with Coastal Shipping

THE fears expressed recently by Mr. Kenneth Pelly, President of the United Kingdom Chamber of Shipping, at the possible effects of the proposed Government loans to the British Transport Commission on the coastal shipping services, are surely exaggerated. As he admits, the tonnage of British ships under 1,200 tons already has declined by 53 per cent since 1939, largely because of competition from internal transport. During this time the physical efficiency of the railways has been running down and their resurgence, particularly as regards freight traffic, is only now beginning. It is British Railways, for the most part, which will benefit from the loans, but the intensive competition which has affected coastal shipping would appear to have come mostly from road transport. A deputation of shipowners has asked Mr. Harold Watkinson, Minister of Transport & Civil Aviation, for an assurance that British Railways will not enter into "cut-rate competition" with coastal shipping, but the railways, in the past, have always kept in close touch with shipping interests and the Transport Acts of 1947 and 1953 contained special provisions as to such consultation.

All-Electric Control

SINCE Sprague brought his conception of the multiple-unit electric train up to a practical proposition more than 60 years ago there has been no improvement at all commensurate with the principle itself. But there have been constant improvements in equipment details, and one of the most recent is the use of all-electric control to replace the conventional electro-pneumatic systems with contactors and reverser included. A leading field in the application of this development has been on the New York City Transit trains, where 100 cars, each with four traction motors, have been running for 18 months or so, and another 200 for a year or more; and these themselves followed part-way steps initiated on 375 cars in the 1947-48 period and on an experimental car in 1952. Known as the MCM system (Motor-driven, Cam, Magnetic), this control was developed to give an operating cycle of about 30 steps, and to repeat it in service about half-a-million times a year, with lower inspection and maintenance costs than the usual electro-pneumatic apparatus, and to do this on rather lower weight and with possibilities of more complete standardisation of constituents. A goal of 100,000 miles of entirely trouble-free and maintenance-free operation is now more or less achieved.

Diesel Traction in Jamaica

ADOPTION of diesel traction for all passenger services of the Jamaica Government Railway has certainly improved the commercial prospects. Traffic has increased considerably, and many business travellers between Montego Bay and Kingston have begun to use the diesels instead of their own cars. In some cases people who formerly never considered the railway make day trips between the two centres, going by air in one direction and returning by train. A few steam locomotives have been retained for shunting and goods trains. Much use is made of small railcars for short journeys, as for instance, in the movement of schoolchildren—who until recently, it is reported, were the principal source of passenger revenue. The railway has been adversely affected by the

migration to Britain of some of its staff and of potential recruits of good quality. Despite the labour shortage, the permanent way generally is in good condition ; but maintenance and re-painting of stations and other installations has suffered.

Testing a Journal to Destruction

AN experiment was carried out recently in France, as a sequel to results recorded in American laboratories, with the object of comparing designs of axlebox and establishing the cause of the fracture of journals under overheating. It has been shown that failures are due not so much to the temperature as to the fact that if bronze bearing surfaces are used the copper content finally will penetrate the heated journal itself and render it gradually more brittle until breakage results. By using forms of cast iron this danger can be eliminated or greatly diminished. The French National Railways, having arrived at a particular specification for such material, decided to run a test train, in which old and new type boxes were allowed to get hot, between Laroche and Autun, about 100 miles. In the old design the journal broke away from the wheel centre 38 miles from the start. A new wheel set was then put in place and the vehicle detached a short way further on. The other box was not touched and the journey was continued at speed to Autun, with one short stop only for inspection purposes. On arrival the journal was seen to be red hot but still intact.

Transport After the Recess

PROVIDED that the change of Government does not result in an alteration in business, transport will occupy the House of Commons when Parliament reassembles on Tuesday. The Transport (Railway Finances) Bill, which passed through its Committee stage without any amendment of substance then comes up for Report and Third Reading. The Bill provides for Government advances to cover deficits and the interest thereon up to 1962 with the former limited to £250,000,000. It also allows the British Transport Commission to charge to capital account interest on borrowings for capital investment up to 1965. The Bill received an unopposed Second Reading, but Members on both sides were somewhat sceptical of the Commission estimates of future revenues, which anticipated that the modernisation and re-equipment programme would put the railways in balance by 1961 or 1962 with an annual surplus of £50,000,000 being earned by 1970. In Committee, the Opposition stated that it would have moved to increase the permitted Government advances had it been possible to do so, but Parliamentary procedure precludes increasing the charge on the Exchequer, and the Opposition contented itself with proposing that the Minister and Commission should have greater flexibility in regard to the period over which advances could be made and the period for and amounts of repayment. The Minister of Transport & Civil Aviation, Mr. Harold Watkinson, resisted any such change.

Since Parliament rose the position has worsened, and the Minister should consider whether the original proposals are adequate to meet the changed situation. Oil prices have so increased that an additional charge of some £8,000,000 a year is imposed on the Commission ; London Transport faces a wages bill higher by £1,500,000, and British Railways wage demands which would add millions more. The increase of the 2½d. fare to 3d. on London Transport goes only a small way in offsetting this, nor have increased traffics resulted to the extent hoped from the oil shortage. It is certain, therefore, that the Commission deficits will be greater than estimated. Although some increase in fares and charges is inevitable the time-lag in their imposition and the law of diminishing returns are both likely to prevent their being raised sufficiently to close the gap. Mr. Watkinson therefore is likely to be pressed to provide more up-to-date estimates of the Commission's future earnings and to modify the rosy optimism he displayed during the earlier stages of the Bill, which he has described as "a carrot and stick method." If the carrot is to attract it must be large enough and if the stick is to be effective it must be wielded with conviction.

Further ground for querying the hopeful estimates of the results of modernisation is provided by the experience so far of oil shortage. The resistance of traders to transfer from road to rail reveals that the railways have lost the goodwill and confidence of many. Admittedly, it seems that the road hauliers, fearing to lose traffics permanently, have campaigned successfully to receive enough fuel to maintain their services to a greater extent than was the Government's intention, but the fact remains that the reluctance of traders to turn to the railways gives cause for concern. Confidence that the railways can carry their goods speedily and safely has regrettably been lost. Modernisation and re-equipment in itself cannot necessarily win back that confidence easily or quickly. As the Transport (Railway Finances) Bill passes through the remaining stages in the Commons and House of Lords, greater assurance is likely to be sought, and should be provided, of the steps the railways are to take as modernisation proceeds to provide the services industry requires and at a price it is willing to pay. For its part the Opposition may well draw the moral that the present situation reveals the need for a national transport policy. Common ownership of the railways and British Road Services has enabled the latter alone among the road hauliers to transfer a sizable proportion of traffics to the railways. For the rest the large number of private hauliers in existence since disposal of over half the B.R.S. fleet is an obstacle to co-ordination of the different means of transport, desirable as it is during such an emergency as the present.

Now that the Minister of Transport is a member of the Cabinet and the importance of transport thereby duly recognised, though rather belatedly, the opportunity for greater decision on transport policy is provided. The oil shortage has revealed the lack of a transport policy and plan, in that no Government since the war has decided with sufficient definition the extent to which traffic is to be encouraged to flow to the different means of transport. Both roads and railways were starved of capital until quite recently, and now both are being better treated. But if the capital investment contemplated is to be fruitful some serious thought is needed on transport policy, and Parliament, now being asked to provide the money to meet the Commission losses, is likely to demand it. Political interference must be avoided and Ministerial intervention, regrettably not rejected by Mr. Watkinson during the debates on the Bill, eschewed, if the Commission is to operate commercially and reach that happier state of balancing its accounts which modernisation combined with the merchandise charges scheme is aimed to achieve. Only then can it feel safe from politics.

Forthcoming Combustion Engine Congress

FURTHER details have now been received regarding the fourth International Congress on Combustion Engines which is to be held in Zurich, and which was the subject of an editorial in our May 11, 1956, issue. Printed programmes and application forms were not available at time of going to press, but most essential details have been announced and these are as follow:—

The technical sessions of the congress will begin on Monday, June 17, and close on Saturday morning, June 22. If they wish to do so, delegates may remain in Switzerland for an organised two-day tour of the country on June 23 and 24 and for an additional works visit which has been arranged for Tuesday, June 25. Fees for the congress, which include the provision of pre-prints, cocktail party, and official banquet, are Sw. fr. 100 for gentlemen and Sw. fr. 70 for ladies. A small additional charge will be made to cover the fares of those participating in works visits. Hotel accommodation is payable separately. No U.K. registration fee will be payable to the British National Committee by any individual company or association (or members thereof) which is a supporter of that Committee. The theme of the 1957 congress is "Supercharged Diesel

Engines and Combustion Turbines in Various Spheres—Marine, Traction, and Power Stations." Meetings will be held in the Auditorium Maximum of the Swiss Federal Institute of Technology. The official languages of the congress are English and French, and all papers presented and discussions will be in one of these two languages.

The wide scope and interest of the congress is shown by the titles of the 23 papers provisionally accepted from 11 countries. These are:—

"Experience with high-pressure-charged engines operating in sea-going ships" (Germany); "Four-cycle internal combustion engines specially built for pressure-charging" (Switzerland); "Present and future of supercharging of the internal combustion engine" (Switzerland); "A highly supercharged (100 per cent) two-stroke, low-weight diesel engine" (Sweden); "Supercharging two-stroke single-acting diesel engine" (Japan); "Supercharging Nohab-Polar two-stroke loop scavenging diesel engines, using pulse system with scavenging pump" (Sweden); "Pressure-charging a high-speed two-stroke single unit" (Japan); "Operating experience of exhaust-gas turbo-charged Deutz two-stroke diesel engines working on loop-scavenge problems for marine propulsion and railway traction" (Germany); "Gas turbines as prime movers in power stations and steel works. Examining, operating and maintenance costs, availability and planning of future development" (Switzerland); "Experimental 2,500-h.p. gas turbine" (Japan); "Development of the long-life marine gas turbine" (United Kingdom); "Two-stroke turbo-charged engines and the influence of engine and turbo-charger characteristics on engine development" (Denmark); "The results of supercharging with exhaust gas turbo-chargers on two-stroke loop-scavenge medium and high output engines" (Italy); "Development and results of supercharging two-stroke Sulzer engines" (Switzerland); "Experience and possibilities of supercharging opposed piston two-cycle diesel engines for marine service" (United Kingdom); "Some special problems in the adaptation of free-piston gas generators to the output pressure characteristics of turbines" (France); "Analysis of the methods of combustion in gas turbines" (Spain); "Field experience with the use of residual fuel oils in gas turbines and the influence of additives" (United Kingdom); "Supercharging of present-day marine diesel engines" (Belgium); "Traction supercharged diesel motors—the results and requirements of supercharging in the field" (France); "Turbo-charged diesels for the propulsion of tankers" (France); "Distribution of heat flow in high-duty internal combustion engines" (United Kingdom); "Operational experiences of our gas turbine, free-piston and diesel engine Liberty Ship conversions" (U.S.A.).

An important aspect of the congress will be the discussions which will arise from the papers listed above. In addition, visits are being arranged to various works and there will be the customary special arrangements for ladies accompanying delegates.

Tasmanian Government Railways in 1954-55

FROM Mr. C. E. Baird, Transport Commissioner in Tasmania, we have received his Commission's report for the year ended June 30, 1955. It shows a loss of £707,224 incurred on all the operations of the Commission, a figure greater by £29,826 than that for 1953-54. This loss was due mainly to a deficit on railway working of £1,031,984, a sum £63,961 in excess of that in the previous year. Actually, railway revenue was £189,356 higher than in 1953-54, but working expenses increased by £215,847, of which £167,325 was accounted for by higher wages and salaries. The average wage per employee charged to working expenses rose from £630 to £679 during the year. There was a comparatively small increase in cost of materials, but interest charges increased by £27,554 and train-mileage by 168,524 during the year under review.

Despite this continued increase in the loss on the railways—due to factors beyond the Commission's control—they had never before been so efficient nor had they served the public so well. It is significant that though net ton-miles hauled had increased from 63,000,000 in 1947 to 96,000,000 in 1955, 40,000 fewer goods train-miles were required to carry this increased traffic. Other relevant figures are given in the table below:—

PERCENTAGE INCREASES OF 1954–55 OVER 1946–47

	Increase per cent
Net ton-miles of goods carried	51
Average load per train-mile	57
Average density of traffic per route-mile	58
Revenue per train-mile	266

PRINCIPAL RESULTS OF WORKING

	1953–54	1954–55
Passenger journeys	3,284,978	3,114,429
,, train-miles	852,000	1,014,000
Goods and mineral tonnage	947,479	1,015,573
Gross ton-miles	1,046,000	1,052,000
	(£ thousands)	
Passenger revenue	174	171
Goods ,,	1,855	2,042
Total operating revenue	2,143	2,332
Working expenses	2,651	2,867
Loss on working	509	535
Interest and depreciation	459	497

Measures taken with a view to reducing the deficit included a decision to close the Nietta line between Dewpearl and Nietta, on which the annual loss was £3,000; only 42 trains a year were run over that section. Moreover, it was recommended that the Strahan-Zeehan line also should be closed as it was losing £16,900 annually and there was no difficulty in carrying the traffic by road. However, the Government decided that it should be kept open for a trial period of five years, as the line completed rail connection between Queenstown and Burnie.

In addition, there was an increase in freight rates, expected to yield another £130,000 a year, as well as the replacement of timber by steel bridges, the use of Hallade and Gaugemaster track-recording instruments, and relaying with 82-lb. rails, all to reduce maintenance costs. Improvements in and additions to workshops and an increase in mileage of diesel-electric locomotives were also effected. To secure a new standard of travel three new articulated saloon coaches were under construction in Launceston railway shops to replace railcars on the "Tasman Limited" service. They were expected to be in service—hauled by British-built diesel-electric locomotives—between Hobart and Wynyard by the end of 1955. During March of that year, a "Made in Tasmania" show train, consisting of 17 vehicles headed by two diesel-electric locomotives, travelled over 700 miles in a tour of the State to display indigenous products.

Record Results in Nigeria

THE report of the Nigerian Railway for the year 1954-55, by Colonel Sir Ralf Emerson, General Manager of the railway during the period under review and now Chairman of the Nigerian Railway Corporation, covers the last full financial year of the Government undertaking, and will be followed by a report for the period April 1 to September 30. This brings the railway to the vesting day, October 1, 1955, of the Nigerian Railway Corporation, which is now responsible for the railway. In its last full year, the Nigerian Government Railway moved more traffic, earned more gross revenue, and closed its account with a larger net surplus than in any previous year of its existence. Sir Ralf Emerson states that it will be many years before the Nigerian Railway Corporation can achieve such a satisfactory result.

In the year under review, revenue at £13,374,000 exceeded the estimate by £750,000 and was 14 per cent higher than in 1953-54. Operating expenditure, including a contribution of £430,000 to the renewals fund, increased by 16 per cent to £8,148,000. Some £308,000 for payment of arrears of salary to railway staff for the half-year October, 1954, to March, 1955, and for increased pensions contributions consequent on the adoption of recommendations in the "Report of the Commission on the Public Services of the Governments in the Federation of Nigeria, 1954-55," is included in the operating expenditure, and

this item accounts for more than 4 per cent of the increase. The surplus on operating account was £5,226,000. During the year, work continued on a wide range of installations and equipment. The new station at Jos was opened in June, 1954, and the new Lagos Terminus in May, 1955. The remodelling schemes at Ibadan and Zaria and at other stations were proceeded with and the work of relaying the Offa-Jebba section in 80 lb. R.B.S. material was completed with the exception of the area of the Jebba station remodelling scheme. On the Kafanchan-Jos section, 35¼ miles were relaid in 60 lb. R.B.S. material and preliminary work commenced on the Enegu-Port Harcourt section, later to be relaid with 80 lb. rail. Steps were taken to extend radio-communications and improve signalling and train control. During the year, 23 locomotives, two coaches, and 179 wagons were received, and at the end of the year 10 main-line locomotives, four "River" class locomotives and six diesel locomotives were on order, as well as five steam shunting locomotives, 138 coaches, and 168 wagons.

A report on the economic development of Nigeria was published during the year by a Mission of the International Bank for Reconstruction & Development. This recommended a railway capital expenditure of £9,023,000 for the years 1955-60, compared with the railway estimate of £8,027,000. The recommendations differed from the Nigerian Railway programme only on the question of the future of the Bauchi Light Railway and developments in the provinces of Bauchi and Bornu, and on the extent to which the wagon stock should be increased. A traffic survey was commenced in December, 1954, to consider the possibility of extending the railway on the 3-ft. 6-in. gauge from Rahama to Potiskum and thence to Maiduguri, from Damaturu via Bornu to the bank of the river Benue, and for converting the Bauchi Light Railway to 3 ft. 6 in.

Engine mileage rose by almost 1,000,000 miles to 7,884,121 and freight net ton-miles increased by 19 per cent to 1,079,026,000. The average length of haul per paying-ton rose to 473 miles compared with 452 in 1953-54. The latest "River" class engines supplied by the Vulcan Foundry Limited, delivery of which continued throughout the year, are fitted with Skefko roller-bearing axleboxes, a new departure for the Nigerian Railway. The first four of 10 750-h.p. Bo-Bo diesel-electric locomotives, with a starting tractive effort of 29,000 lb., supplied by the English Electric Co. Ltd., arrived during the year and went into service on the Zaria-Kano section, where water problems in the dry season are acute. The report states that, except for minor teething troubles, they have proved most satisfactory, reducing the overall time for the Kano-Zaria journey from 4 hr. 3 min. for limited trains to 3 hr. 20 min., and the time for through goods trains from five hours to 3 hr. 50 mins. In March, 1955, the diesels worked an average of 253 miles a day compared with 147 miles by steam locomotives. A tender shunting locomotive, supplied by the Hunslet Engine Co. Ltd. against an order for six, is specially designed to work for long periods without the need for re-fuelling or re-watering. One of these locomotives will be stationed at Jebba and the remainder at Kano.

Passenger traffic suffered in the upper classes from the growth of local air services, but the general prosperity of Nigeria has led to the growth of second class traffic. On some services, canteen cars, which were introduced to cater for third class passengers, have been adapted to supply meals for first and second class passengers. Limited trains from Lagos were increased to five a week, enabling complete trains to run through to Port Harcourt, Kano, and Jos without re-marshalling at Kaduna Junction. Through limited trains, two each week in either direction, were introduced between Port Harcourt and Kano. Much revenue was lost by ticketless travel and a special ticket checking organisation was formed to start work in 1955-56.

Total freight tonnage rose by 303,904 tons to 2.601,475. Groundnut traffic increased by 32 per cent in tonnage and 50 per cent in revenue because of a good crop, a substantial backlog, and greater locomotive availability. There was also a good cotton crop with a consequent increase of 48 per cent in tonnage and 5 per cent in revenue. Potential cotton traffic is believed to be high as production increases. Coal traffic increased slightly to 655,826 tons. Some of the more important results are as follow:—

	1953-54	1954-55
	(thousands)	
Passenger journeys	5,454	5,451
Tonnage hauled (paying)	1,714	1,983
Passenger train-miles	1,204	1,209
Goods train-miles	4,277	5,056
	(£ thousands)	
Passenger, parcels and mails receipts	1,515	1,500
Goods and livestock receipts	9,740	11,371
Road transport receipts	105	123
Total operating receipts	11,701	13,374
Operating expenditure	6,602	7,718
Operating surplus	5,098	5,656
Renewals contributions	1,500	1,500
Interest on capital	827	828
Net surplus	2,735	3,335

British Transport Commission Traffic Receipts

THE traffic receipts of the British Transport Commission for Period 13, the four weeks ended December 30, 1956, are the first to be affected to any great extent by the restrictions on petrol and oil supplies. Passenger receipts of British Railways, helped by heavy Christmas traffic, rose to £10,168,000, an improvement of £1,027,000 on the same period of 1955. A better measure of the extra traffic obtained because of road travel restrictions probably is the increase in receipts of £2,359,000 compared with Period 12, against a rise of £1,603,000 as between the same periods in 1955. London Transport railway receipts fell slightly from Period 12, presumably as a result of the virtual cessation of business travel during the Christmas holidays, and there was a similar decline in road services receipts. Both railway and road services, however, showed a marked improvement on 1955.

Provincial and Scottish buses, despite fuel restrictions, had higher receipts than in the previous period or in Period 13 of 1955. Passenger shipping receipts showed the usual periodical rise with an increase of £17,000 on the previous year.

—	Four weeks to December 30, 1956		Incr. or decr.	Aggregate for 52 weeks		Incr. or decr.
	1956	1955		1956	1955	
	£000	£000	£000	£000	£000	£000
Passengers—						
British Railways	10,168	9,141	+ 1,027	126,853	117,932	+ 8,921
London Transport:						
Railways	1,771	1,611	+ 160	21,973	20,514	+ 1,459
Road Services	4,305	4,005	+ 300	55,582	53,032	+ 2,550
Provincial & Scottish buses	4,070	3,726	+ 344	56,632	54,127	+ 2,505
Ships	298	281	+ 17	6,354	6,199	+ 155
Total passengers	20,612	18,764	+ 1,848	267,394	251,804	+ 15,590
Freight, Parcels & Mails—						
British Railways:						
Merchandise & livestock	8,383	7,876	+ 507	104,997	105,978	− 981
Minerals	3,897	4,033	− 136	51,933	48,947	+ 2,986
Coal & coke	9,701	9,334	+ 367	126,127	119,071	+ 7,056
Parcels, etc., by passenger train	3,662	3,335	+ 327	46,997	41,873	+ 5,124
Total freight, British Railways	25,643	24,578	+ 1,065	330,054	315,869	+ 14,185
British Railways C. & D., etc.	1,005	929	+ 76	12,820	12,255	+ 565
Others*	3,915	4,041	− 126	55,684	62,462	− 6.778
Total Freight, Parcels, & Mails	30,563	29,548	+ 1,015	398,558	390,586	+ 7,972
Total	51,175	48,312	+ 2,863	665,952	642,390	+ 23.562

* Inland waterways freight. road haulage and ships

Merchandise and livestock receipts of British Railways, which have been below those of 1955 since the first period of 1956, except for Period 6 when the 1955 figures were affected by the strike of footplatemen, were less than those of Period 12. This follows the seasonal trend, but the fall

was only £824,000 against £1,421,000 in 1955 and the receipts of £8,383,000 were £507,000 more than in the same period of 1955. The fall in mineral traffic is a seasonal matter, but the reduction of £136,000 compared with 1955 is perhaps more than might have been expected. Coal and coke traffic held their own, with an improvement of £367,000 on 1955, and parcels traffic receipts, which have been buoyant in recent months, were £327,000 better than in 1955.

Railway collection and delivery services had slightly higher receipts than in Period 12—a reversal of the usual trend at this time of year—and inland waterways, road haulage, and shipping freight receipts approached still more closely those of 1955. The increase of £2,863,000 in the period for all Commission traffics, and the increase of £23,562,000 for the 52 weeks is a notable improvement on the position at the end of 1955, when aggregate receipts were £3,046,000 less than in 1954.

PERCENTAGE VARIATION 1956 COMPARED WITH 1955

	Four weeks to December 30	52 weeks to December 30
British Railways—		
Passengers	+11·2	+7·5
Parcels	+9·8	+12·2
Merchandise & livestock	+6·4	−0·9
Minerals	−3·3	+6·1
Coal & coke	+3·9	+5·9
Total	+6·2	+5·3
C. & D. services	+8·1	+4·6
Ships (passengers)	+6·0	+2·5
British Road Services, Inland Waterways and Ships (cargo)	−3·1	−10·8
Road Passenger Transport, Provincial & Scottish	+9·2	+4·6
London Transport—		
Railways	+9·9	+7·1
Road services	+7·4	+4·8
Total	+8·1	+5·4
Aggregate	+5·9	+3·6

Electric and Diesel Traction : A Danish Survey

(*By a correspondent*)

ONE of the most searching enquiries made into the economics of diesel and electric traction has been undertaken by a committee set up in 1951 by the Danish Academy for Technical Science at the request of the General Manager of the Danish State Railways. Besides senior officers of the State Railways the committee included representatives of outside industry, and the services were enlisted of Swedish and American consultants. The committee's report shows that despite thorough investigation into the economic and related aspects of either form of traction, the results are inconclusive in that both the consultants and, eventually, the committee itself were evenly divided in their recommendations. This result, however, does not detract from the value of the effort made ; it reflects the fact that, at least in conditions prevailing in Denmark, the margin of economic advantage as between electric and diesel traction is so small that the result can easily be reversed even by minor modifications of the basic assumptions.

In principle, the survey was confined to a selected system of trunk lines where the volume of traffic or other considerations seem to call for the continued operation of locomotive-hauled trains, it being assumed that those branch lines which will not be closed will be worked by diesel railcars. A further simplification was introduced by confining the detailed studies to the trunk lines in the First District of the State Railways, which includes the islands of Zealand and Falster. But the results thus obtained were also applied to the main lines in the rest of the country, covered by the Second District—Jutland and Funen.

With electric traction, the detailed calculations were originally based on the 16,000-V. 16⅔-cycle system used in Sweden, Norway, Germany, Switzerland, and Austria. A subsequent calculation showed that the new 50-cycle system pioneered in France would entail savings of some 7 per cent compared with the 16⅔-cycle system, and these savings were taken into account.

The calculations were made for three main types of trains: locomotive-hauled passenger trains, locomotive-hauled goods trains, and multiple-unit trains. These types were further sub-divided into eight categories, according to the average speed of the train, and the average distance between stops. On this basis, and on the basis of the known characteristics of electric and diesel locomotives employed in Sweden and Denmark respectively, the average energy and fuel consumption per 1,000 gross *tonne*-km. has been calculated at between 32 and 44 kWh. for electric traction, and between 8·1 and 8·9 litres of fuel oil for diesel traction. The calculations were extended to four types of haulage: (*a*) steam traction with existing steam locomotives, combined with diesel railcar working ; (*b*) steam traction with new, more powerful and improved steam locomotives, combined with diesel railcar working ; (*c*) diesel traction, using new diesel locomotives but existing diesel railcars ; and (*d*) electric traction, using the same number of locomotives and motor coaches as with diesel traction.

It was shown that, on the basis of 1951 traffic volumes and train speeds and of 1954 prices, the total annual cost (including interest and amortisation of capital) of diesel traction would be about 13 per cent lower than that of electric traction, whilst the cost of combined steam and diesel traction would be 15-19 per cent higher than that of electric traction. The picture changes considerably in favour of electric traction if prospective increases in traffic volume and speed are taken into consideration, and it is largely because of their divergent views on these assumptions that the two groups in the committee have arrived at different conclusions.

A first group of six members believes that the 45-50 per cent increase in average speed which the proposed electric locomotives would be capable of bringing about would tip the balance decisively in favour of electric traction, especially because the higher speed would attract more new traffic. They therefore recommend the adoption of electric traction, beginning with the electrification of the trunk lines in Zealand and Falster.

The other seven members of the committee are of the opinion that both the initial and recurring costs of diesel traction are likely to remain lower than those of electric traction for a long time to come and that, because of the smaller capital investments, the introduction of diesel traction would provide an opportunity to await, without economic disadvantages, the results of further technical developments in the field of electric as well as diesel traction before the management must commit itself to the heavy capital expenditure for electric traction.

Letters to the Editor

(*The Editor is not responsible for opinions of correspondents*)

Eastern Region Multiple-Unit Electric Trains

January 2

SIR,—In the new stock on the Liverpool Street to Southend Victoria service, whilst the trailers, as in the Southern Region, are not too bad apart from excessive rolling, the motor coaches are very rough riding.

Is there not time to re-design these sets before more are made for the Tilbury line to Southend as, in the stock to be used on that line when electrified at 25 kV. a.c., there is no need for all four motors to be on one coach to facilitate series-parallel groupings? I suggest one motor per bogie on the inner two cars, or even one single-motor bogie per coach, unless, of course, more refined bogie and motor suspensions are contemplated.

Yours faithfully,

JOHN RODGERS

132 Worrin Road, Shenfield, Essex

THE SCRAP HEAP

Old Railway Fire Engine Preserved

A former Great Western Railway fire engine which has been in service for over 40 years at Swindon Works, has been added to the already considerable store of historical relics which the British Transport Commission has collected as the nucleus of a transport museum.

The engine bears the coat of arms of the former G.W.R., also the inscription "G.W.R. Fire Brigade, Swindon," and is thought to have been the first motor fire engine in Wiltshire. Its first big task was in 1915, at a fire at the Southern Laundry, Swindon, next to the Great Western Hotel; its last major action was in 1942, when, after an enemy air attack, it gave assistance in saving the big gasholder at Swindon Works.

Built in 1912, the engine has an overall length of 17 ft., and weighs 4 tons 3 cwt. It is powered by a four-cylinder 60-h.p. engine which operates a Gwynn turbine pump capable of pumping water at 400-500 gal. a minute. A G.W.R. vacuum brake gauge is fitted to the engine.

Loyalty

"What you done, gov'nor," explained this official with amiable finality, "is to travel down by London North Eastern and come back by London Midland & Scottish." On hearing these nostalgic titles a little knot of porters made gruff noises of assent. The time was the present; the scene, St. Pancras station. We were debating the validity of my return ticket. . . . Business had taken me to Wheathamstead in Hertfordshire, for which destination the outward bound trains leave from Kings Cross. Business was soon done. It then transpired that there are times when not for another hour will a train leave Wheathamstead for London. Faced with such a hiatus I had gone by bus to St. Albans and thence returned . . . to a different terminus.

In vain to argue that British Railways comprised a single unit at the service of those who, in however theoretical a way, now owned them; in vain to point out that my journey, as it had been made, was in fact shorter than that for which the ticket had been issued. . . . The ticket collector brought the matter back to fundamentals. "Be reasonable," he said. "If you get away with this, here am I, on an L.M.S. station, stuck with an L.N.E.R. ticket, which I got no call to have. If I hand it in, what happens? I'm the jimmy-muggins. Of course, you can claim a refund." There was a murmur of appreciation, for so lucid a statement.

It was indeed a telling speech. One of its effects was to leave the unitary nature of British Railways shattered into fragments. . . . The fidelity of the men of the railway service to their past origins had been established beyond doubt. Scratch a Briton, and you find history under his skin. Faced with deadlock, the ticket collector left it to me to do the decent thing. . . . Here was a man who, when an issue had to be faced, took his stand upon no splitting of legalistic hairs. He cited no regulation, nor quoted conditions printed on the back of the ticket. . . . It was the regimental spirit. To the ticket collector much more was at stake than a detail in administration. The honour of his unit was his to uphold. . . . To encounter fidelity to a dead cause is always a moving experience, and my hand went to my pocket without reluctance. . . . "Let's see, sir, it was a third-class ticket, wasn't it?" said the ticket collector as he wrote "Second class" upon the receipt he gave me.—*From "The Times."*

At the Schoolboys' Own Exhibition

Models of the Deltic locomotive and engine, part of the English Electric Co. Ltd. display at the recent exhibition at the Horticultural Hall, Westminster

Antique Bonds

Referring to a mention by "Peterborough," in *The Daily Telegraph* of December 24, of "most venerable" Italian railway bonds which still occasionally change hands, dating back to 1862, a correspondent states that these bonds are those of the South Italian Railway Company, which was formed in the year mentioned. The line was taken over by the Italian Government in 1906, subject to an annual payment, and the company became an investment and banking concern.

There are at the moment outstanding some of the original 3 per cent obligations of the company, redeemable at par in 1966.

These Fuelish Things

This is the disenchanted hour
When the protagonists of power
May, willy-nilly, find some cause
For let or hindrance, halt or pause
In their iconoclastic dream
Of totally eschewing steam.

Extremity's splendid spur;
One never knows what may occur
Or what new marvels may emerge.
Invention may be on the verge
Of stranger things than man surmises;
We may be due for some surprises.

But man's at best a mundane soul;
Wings he assumes, but, on the whole,
Be it uranium, coal, or oil,
His power derives still from the soil.
In the long run it may be worth
Some grief to bring him back to earth.

But every winter has its spring;
The present may seem harrowing,
But hope looks forward, starry-eyed,
To what the future may provide.
With all this to reflect upon,
Let's go and put the kettle on.

A. B.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Staff Shortages

Shortage of staff, especially drivers, firemen, and guards, made conditions exceptionally difficult on the Natal System during recent months. During one period of a week, for instance, 44 trains had to be cancelled on the North Coast and 56 trains on the Greytown and East Griqualand branch lines. Apart from sending staff to Natal from other Systems, efforts are being made to recruit suitable material for training in the special categories in which persistent shortages have been experienced for several years.

RHODESIA

Rail Rates on Bulk Copper Doubled

The Rhodesia Railways Board has confirmed proposals announced last October to double rail rates on bulk copper carried from Northern Rhodesia, an increase which it is estimated could cost the big copper companies about £2,800,000 a year. The board has rejected objections lodged by the copper companies. The increase is part of a general increase in certain mineral rates to which the board has been considering objections. The proposed increases in the rates for lead and zinc have been dropped completely and asbestos grades have been adjusted to effect an overall reduction in the original proposed increase. The rate for carrying copper in full truckloads from Ndola to Beira or Lourenço Marques has been increased from under £7 a ton to £14 15s. a ton. The Copperbelt mines consign by rail about 400,000 tons a year to these ports. Rail consignments from other Copperbelt centres have had proportionately similar increases. There have been certain minor modifications for copper wire bars, copper scrap and steel cored copper.

The copper rates are effective from October 1, 1956, and the new asbestos rates from January 1, 1957, and on the same date increased rates for chrome ore, cobalt, certain specified ores and concentrates also came into effect.

NEW ZEALAND

New Type of Insulated Wagon

The Commonwealth Engineering Co. Ltd., of Sydney, is to design for the N.Z.G.R. a new type of all-steel insulated wagon, which is expected to be easier to maintain than the present vehicles.

When the design is completed tenders will be called from all parts of the world for the construction and delivery, as part of the 1955-58 rolling stock programme announced in October, 1954, which includes 100 bogie and 150 four-wheel insulated wagons.

Auckland Okaihau Diesel Service

The new daily railcar service between Auckland and Okaihau, 196 miles, introduced by New Zealand Railways on November 12, 1956, represented an acceleration of 55 min. northbound and 84 min. southbound, compared with the previous steam service. Because of the number of intermediate stops required, approximately every six miles, and because of the incidence of gradients, curvature, and speed restrictions, the Northland railcar service is not of the same high-speed nature as those on some other more favourable routes. The schedules allow 7 hr. 40 min. northbound and 7 hr. 35 min. southbound, with up to 33 intermediate stops. This is an improvement of well over 3 hr. compared with the time allowed the first through express trains in December, 1924.

CHINA

New Construction

It has been officially announced that the railway building programme under the first Five-Year Plan has been completed a year ahead of schedule, with completion of some 2,500 miles of new line in less than four years.

Important new lines include the Litang-Tsamkong railway to the new port in the Luichow peninsula opposite Hainan Island; the Chinese section on the Peking-Ulan Bator-Moscow railway; the Fengtai-Shacheng railway through the Great Wall serving as a new section on the Peking-Paotow line; and the Paoki-Chengtu railway linking the north-west with south-west China.

In addition, work has started on the Neikian - Kunming, Chungking - Kweiyang, and Kweiyang-Kinchengkiang lines, and on a railway from Pisechai in Yunnan province to Hokow on the Vietnam frontier.

Secondary Lines

Most of the secondary and branch lines built under the five-year plan for industry and forestry development have been completed. These include the railways in the future Paotow and Wuhan iron and steel areas, Lanchow and Sian and other industrial areas, as well as in the forest areas in the Great and Little Khingan mountains and the Changpeishan mountains in north-eastern China.

PERSIA

Teheran-Meshed Line Completed

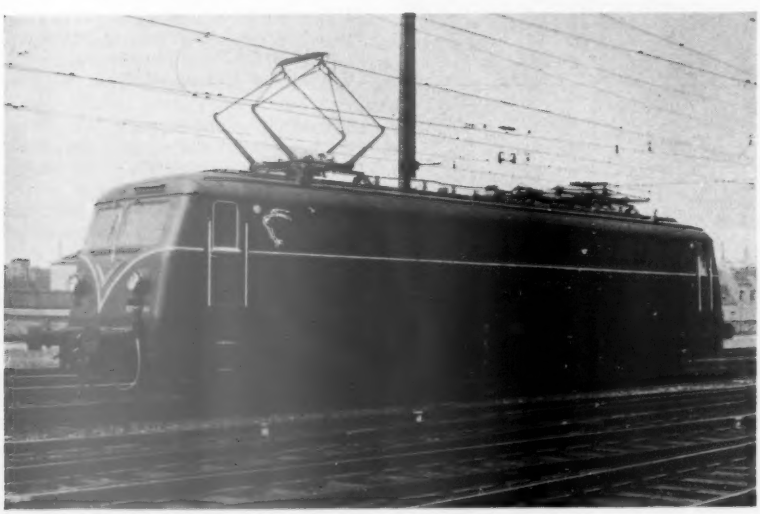
Completion is reported of the 4-ft. 8½-in. gauge line, over 700 miles long, from Teheran to Meshed, in the extreme north east of the country.

BRAZIL

São Paulo Metropolitan Line

The São Paulo Government has accepted the tender submitted by Alweg Monorail Corporation, to build 60 miles of lines for a metropolitan railway in São Paulo city at a cost of U.S.A. $155,000,000. The double line will be semi-elevated, partly above

Belgian Main-Line Electric Motive Power



Bo-Bo locomotive of series "123," built by S.A. Ateliers de Constructions Electriques de Charleroi for the Belgian National Railways

ground and partly underground. The Alweg system adopted uses a rail-faced concrete beam as a track base, mounted on columns of varying height and spaced some 50 ft. apart. Electric power will be used and the vehicles will run astride the rail, instead of being suspended from it. Provision is to be made for trains to run every 1½ min. during rush hours and carry between 50,000 and 100,000 passengers hourly in each direction.

An Alweg representative states that the system, invented by German engineers, has been on trial in reduced-scale form for some years and, if successful at São Paulo, will be adopted between Cologne and the Ruhr.

Financial Assistance to Railways

The Brazilian Bank for Economic Development has been authorised to make the following loans: 241,300,000 cruzeiros, say £1,340,000 at the present free rate, to the Paulista Railway to extend its tracks from Adamantina to Panorama, on the Parana River, in Mato Grosso; 1,010,208,209 cruzeiros to the Sorocabana Railway to buy rolling stock, rails, workshop equipment, signalling, and other materials; 20,000,000 cruzeiros to the Noroeste do Brasil to build a common terminal station at Corumba, Mato Grosso, for its lines and those of the Brazil-Bolivia Railway.

UNITED STATES

Passenger Traffic Competition

Statistics published by the Interstate Commerce Commission Bureau of Economics & Statistics show that during 1955 the railways carried only 4·3 per cent of the inter-city passenger traffic in the United States, as measured by passenger-miles. By far the biggest proportion of movement was in private cars, which accounted for 88·2 per cent; motorbuses accounted for 3·8 per cent, airlines for 3·4 per cent, and inland waterways for 0·3 per cent. As compared with 1954, air travel was up by 16·2 per cent, private car travel by 6·8 per cent, and inland waterway traffic by 2·2 per cent, whereas the motorbus share had declined by 1·9 per cent, and the railway share by 2·6 per cent.

WESTERN GERMANY

Faster Brussels-Cologne Connections

Two new pairs of expresses between Brussels and Cologne will be hauled by diesel locomotives throughout, and limit their stops at frontiers to two min., so reducing the journey time between Brussels and Cologne to 2 hr. 47 min.

Two-Way Working Over Bridge

As the focus of five lines with seven tracks from the north and two lines with three tracks from the south, the double-track railway bridge over the Main at Niederrad, Frankfurt, has caused congestion to traffic over a large area. The bridge is now used by more than 400 trains a day.

Operating conditions have been greatly improved by the replacement a short time ago of one electric and two mechanical signalboxes by a single push-button track diagram type signalling installation, combined with the introduction of two-way operation of the two tracks on the bridge. This has made it possible for a fast and a local train to leave Frankfurt simultaneously in the direction of Niederrad without the need to hold the local train at the bridge. Due to this facility, which is used up to 60 times a day, operation is now so flexible that an additional bridge and the reconstruction of Niederrad Station are not necessary.

DENMARK

New Wagon Ferry Service

An agreement has been made between the Danish and Norwegian Governments for the formation of a new wagon ferry service between Hirtshals, in the northern part of Jutland, and Kristianssand, in Southern Norway.

The present steamer service is for passengers and cars only, but on completion of harbour improvements, the new ferry will be big enough to take six wagons, and this number has been guaranteed from Norway each day.

The railway terminus at Hirtshals is privately owned and connects with the Danish State Railways at Hjorring, a distance of 20 miles.

SWEDEN

Stockholm Underground Extended

A further extension of the Stockholm underground, from Vällingby to Hasselby Gard in the western suburbs, was brought into use recently. The extension is a surface line and replaces two bus services.

Publications Received

World Railways: 1956-57.—Edited and compiled by Henry Sampson. Fourth Edition. London: Sampson Low's "World Railways" Limited, 25, Gilbert Street, W.1. 13 in. × 8½ in. 502 pp. Fully illustrated. Price £4 4s.—Certain new features appear in the fourth edition. A useful innovation is the series of tables arranged according to six geographical areas, of information on all railways, it is claimed, in every country in each area. The lists of railways seem to us exhaustive; and the 32 headings under which information is given include not only statistics of traffics and of rolling stock owned, but also particulars such as the types of couplings and rail fastenings used, maximum curvature, and speed limits. Considerably more information on U.S.S.R. railways is given, relating chiefly to rolling stock, electrification, and diesel operation. To show more clearly the general trend of development on each railway, additional information in the section devoted to each major railway covers alterations and improvements made during the last year or so, and changes made in locomotive and rolling stock totals, new units in service, units retired, and on order. Changes from steam to diesel or electric traction also are recorded. The list of locomotive and rolling stock builders has been placed in the front instead of the latter part of the book, as in the previous edition. New sections at the back are concerned with long welded rails and rail fastenings, and mechanised track maintenance. The railway system maps vary in quality; some are not up to date, nor do they always achieve the high standard of illustrations general in this book of reference.

Chemins de Fer: No. 201, November and December, 1956 (Special Number). 41 pages, 10⅝ × 8¼ in. 84 illustrations, including four on coloured insert. Price 350 fr. Published by the Association Française des Amis des Chemins de Fer, Gare de l'Est, Paris. This is the 100th issue to appear since the journal assumed its present character, before which it had served as the Association's information bulletin. To mark the occasion prefaces are contributed by M. Louis Armand, President of the Board of Management of the S.N.C.F.; M. Charles Boyaux, General Manager of the S.N.C.F., and M. Jean Dubreuil, President of the Association. Articles include one on developments witnessed in railway working, principally in France, during the past 20 years. The illustrations throughout are of the usual high standard. A special feature of this issue is four coloured photographs showing the "Golden Arrow"; the "Edelweiss" diesel train (Brussels-Zurich) in Luxembourg; one of the "U.1" 4-6-4 streamline locomotives of the La Chapelle depot; and the "Mistral" express.

Nickel Developments.—Literature referred to in the October-November, 1956, issue of the *Nickel Bulletin* includes a survey of developments in Canada, American Welding Society specifications for welding rods and electrodes for joining nickel and nickel alloys, an amplified edition of the atlas of isothermal transformation diagrams of B.S. En steels, and, in relation to construction steels, a summary of papers given at a recent symposium on fatigue; also abstracts reporting further study of the phenomenon of corrosion by vanadium pentoxide, and a review of information on atmospheric corrosion. Copies are available free from the Mond Nickel Co. Ltd., Publicity Department, Thames House, Millbank, London, S.W.1.

Aluminium Coach Doors for British Railways

One-piece die-casting saves one-third in weight over normal construction

ALTHOUGH cast-aluminium sliding coach doors have been in use on the L.T.E. for some time, the recent application by British Railways of this construction to normal-opening railway coach doors is a departure from traditional practice. Use has also been made of one-piece aluminium-cast sliding doors on the Toronto Subway stock, built by the Gloucester Carriage & Wagon Co. Ltd., which are described briefly in the January 8, 1954 issue of *The Railway Gazette*. These are of a simpler structural design than the doors now described, since there is no provision for hinges, locks or sliding windows. Doors which have these latter features consequently require extra internal strengthening to support the weight of the door on its hinges, and so on.

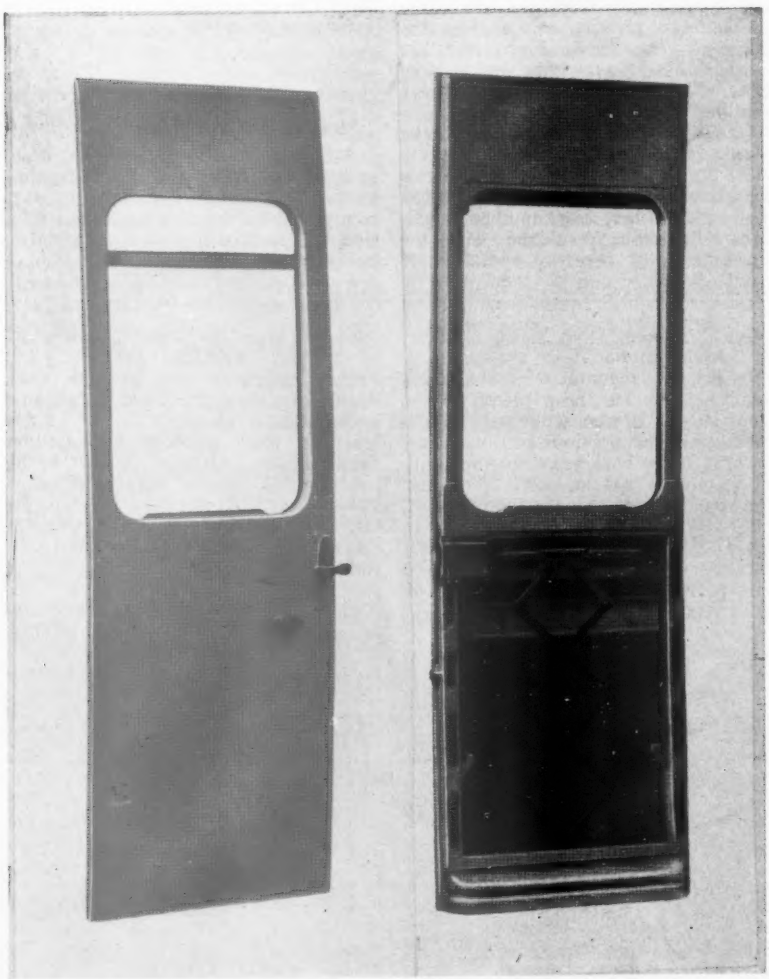
The manufacturers, W. Deans & Son (Yorkshire) Ltd., Beverley, Yorks., claim that a door of this type, weighing approximately 85 lb., complete with window and lock, is about two-thirds of the weight of a standard door at present used on British Railways. The doors have so far been supplied to the Southern, North Eastern, and Midland Regions, and it is anticipated that initially they will be fitted to Euston/Watford British Railways standard coaches, and British Transport Commission standard coaches and diesel multiple-unit cars.

Integral Construction

Of integral construction, each door is a one-piece die-casting, with ancillary castings for the window finisher, all in L.M.6, an aluminium-silicon alloy, and designed to take a British Railways and Southern Region type lock and a British Railways standard full-drop window.

The general appearance of the door may be seen in the illustrations. Externally, the door presents a smooth surface; internally it is provided with strengthening ribs and built-out sides, all sections being as thin as is consistent with adeqate strength. The casting which is designed to reduce machining to a minimum, has a faired-out bottom section, four drain holes being provided in the under surface. The additional die-castings for window guide, window beading and window stops are screwed to the main casting, to suit standard Beclawat full-drop balanced-action windows and fittings.

The doors are finished on the inside by panelling, a 12 s.w.g. aluminium panel being welded above the window, and a sheet of 10 s.w.g. aluminium with $\frac{1}{32}$ in. plasticised-facing fitted below. Three standard British Railways door hinges are fitted, Helicoil steel inserts being screwed into the main casting, to ensure good load distribution from the hanging bolts. Door stops or check straps are screwed on according to requirements. It is understood that the one-piece doors, so far supplied, have proved quite satisfactory in service and that substantial orders are expected in the future.



Views of the cast door showing the clean appearance

SWANSEA COUNCIL NOT TO BUY SOUTH WALES TRANSPORT.—Swansea Borough Council, on December 20, rescinded a resolution passed at a special meeting on November 27 to buy, by December 31, 1957, all the "purchasable parts" of the South Wales Transport Co. Ltd. under the Swansea & District Transport Act, 1936. The Council decided not to acquire the undertaking, the cost of which would have been some £1,000,000. Councillor P. Morris said it would be virtually impossible for the Council to raise the necessary loan without imposing an "intolerable burden" on ratepayers in Swansea. The South Wales Transport Co. Ltd. is responsible for the working of the Swansea & Mumbles Railway.

ROAD CASUALTIES IN NOVEMBER, 1956.—Five hundred and six people were killed on the roads of Great Britain in November and 5,105 seriously injured. There were also 15,904 cases of slight injury, making a total for all casualties of 21,515. Compared with November, 1955, the figures show eight fewer deaths and a decrease of 304 in the seriously injured; slight injury cases decreased by 677 and there was thus an overall decrease of 989. November was the third successive month in which casualties were lower than in the corresponding month of 1955. The totals for the 11 months to the end of November, however, still show an increase over the same period of last year.

Rubber in Railway Engineering

Elimination of metal to metal wear increases service life of rolling stock

ANY radical changes in bogie design are possible only after consideration of all the factors involved. The bogie has the greatest potential for increasing the mileage of rolling stock between repairs; more particularly in electric traction. High acceleration and the forces involved in braking preclude any radical changes, and it is only after prolonged tests under actual service conditions is it possible to evaluate all the factors involved.

The elimination, or even the reduction of the rate of wear in metallic parts, offer considerable economy in the life of rolling stock, and these aspects have of late years received considerable attention by designers, to the extent that non-metallic liners are being increasingly used on both steam and electric stock, both in this country and overseas.

Damping of Vibration

The potentialities of the uses of rubber in various branches of engineering has long been appreciated, especially as a means of reducing the transmission of damping vibration and noise in stationary plant, flexible drives, and so on; it is also many years since rubber was first used in rolling stock buffing and drawgear, and to considerable advantage. Of late years rubber technologists have greatly enlarged the scope of rubber by improvement in mixing techniques, and this aspect was referred to by Mr. S. W. Marsh, Technical Manager, the Andre Rubber Co. Ltd., in a paper delivered recently at a conference organised by the Natural Rubber Development Board, in which he mentioned several of the most recent developments of the uses of rubber.

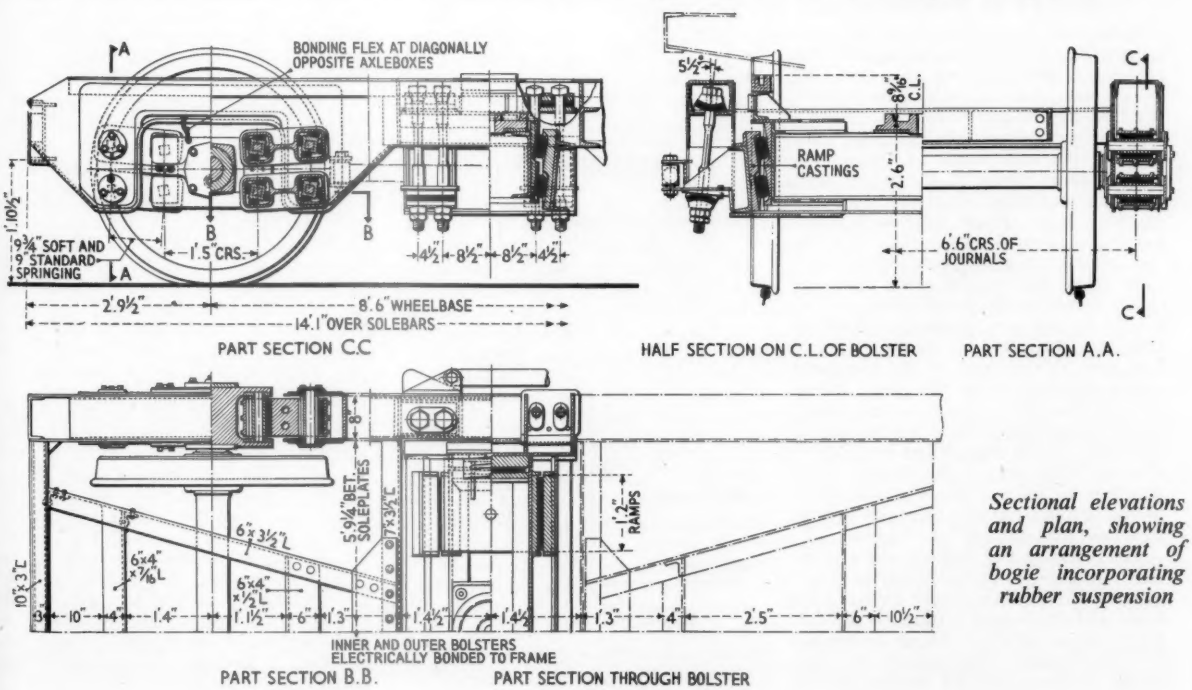
There have been many uses of rubber in railway engineering for components such as bogie side stabilisers, body suspensions for locomotives, gangway suspension, resilient drives, and engine mountings. More recently, however, much thought has been given to its use as a complete bogie suspension medium. A great deal of research work has been carried out, and trials made on London Transport, British Railways, and the French National Railways, and it was now almost a proved fact that a correctly designed bogie employing rubber to avoid wear on metal surfaces will give a good life up to 150,000-200,000 miles without maintenance, apart from wheel turning, and still maintain its riding qualities. Possibly the most unpleasant feature with conventional bogie design is hunting, or transverse movement at speed.

To alleviate hunting, three major problems need serious consideration: elimination of all wearing parts; a suspension system whereby the springs act in three degrees of freedom, i.e. vertical, transverse, and longitudinally; and a suspension system which gives constant periodicity. In a bogie of conventional design the steel spring acts as a resilient unit in the vertical plane only, and the acceleration and deceleration forces are taken by both the hornguides and axleguards, as are also the transverse movements.

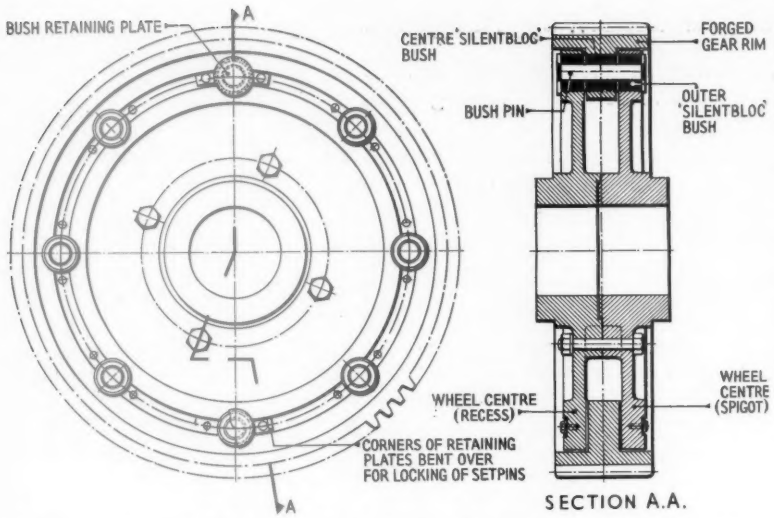
Translatory System

In the case of rubber suspension the rubber units act in three planes, i.e. as a vertical suspension, in rolling compression, and transversely and horizontally by compressing the rubber units. The most recent development is the production of a completely rubber suspended bogie incorporating the translatory system at the bolster, and bonded rubber to metal swing-link units. In this design rubber cylinders are interposed between the inner and outer bolster members which act as main springs in the vertical plane, and also act transversely, and horizontally, therefore all forces transmitted from the bogie centre pivot to the bogie frame are entirely through rubber.

The outer bolster frame is attached to the main bogie frame by means of rubber bonded to metal swing links, which in addition to acting as a vertical spring unit, also acts as a return centralising spring for the bolster, as when the bolster swings over, the rubber is subject to shear, and will therefore tend to release itself from stress or strain. By fitting such a unit the conventional metal-to-metal swing link knife edges are eliminated. In our issue of December 28, 1956, details were given of more recent experiments being carried out by London Transport on bogies with rubber



Sectional elevations and plan, showing an arrangement of bogie incorporating rubber suspension



Diagram, showing the design of resilient gear which incorporates a Silentbloc flexible element

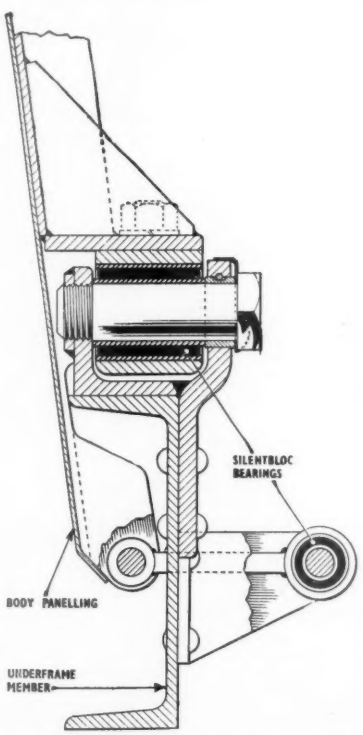
suspension. It will therefore be seen that in this design the only wearing parts on the bogie are wheels and centre pivot—there being no metal to metal contact whatever between these two points. Such bogies will produce an improved ride, be much quieter, and will tend to reduce flange and wheel wear. General maintenance costs of bogies will also be greatly reduced. Various uses of rubber have been made in other railway applications which is exemplified by the pre-stretched form of rubber bushing of which the Silentbloc is an example.

Swing Link Suspension

This form of resilient bush has been successfully used in the swing-link suspension at the centre of the equalising beam on the Metropolitan-Vickers Western Region gas-turbine locomotive. The rubber bearings support and cushion the full weight of the locomotive body, and at the same time permit articulation of the body relative to the bogie. Each equalising beam bearing carries 18-tons static. A variation of this principle was also successfully employed by the same company in the mixed-traffic locomotives for the C.I.E. In this arrangement, each swing-link unit comprises five Silentbloc bearings, one at each end of the two links which are attached to the bogie frame, and another in the centre of the equalising beam, transmitting the weight of the body to the links. The bearings in the two links are of the Duplex type, which is virtually a Silentbloc within a Silentbloc and permits of much greater torsional and conical movements.

The drawing and buffing gear also incorporates pre-stretched bush to transmit the longitudinal forces between the body and the bogies caused by traction and braking efforts. These forces are carried through a pivot pin on the body which carries a parallel motion linkage attached to the bogies cross sets, and in which the Silentbloc bearings are fitted. This arrangement does not interfere with any of the other relative movements between the body and the bogie.

The use of these flexible bearings at the points of relative movement in the drawing and buffing gear dispenses with the necessity for lubrication and the wear of metallic surfaces. The rubber bearings can be renewed with comparative ease if the need arises.



Resilient mounting for side panelling of diesel-electric express locomotives

The nose suspension of traction motors carried on the axles of locomotives is also a field in which this type of bearing can be used to advantage. The usual arrangement is to employ two flexible bearings, one at either end of the link, one end being attached to the motor nose proper while the other is fixed to the bogie frame. With this arrangement the various relative movements which occur are accommodated by the rubber element in the bearings, while at the same time providing a mechanically positive arrangement. A somewhat similar arrangement is employed for the motor lateral location; in this case the link is in the horizontal plane and provides a positive locating device for the motor in the lateral plane, while permitting the necessary vertical movements.

Resilient Type Gears

Resilient type gears have proved their value over many years of practical experience, and here again the Silentbloc type of flexible element is widely used. The resilience is obtained by fitting the rubber bearing between the hub and the gear rim, thus allowing a torsional deflection of the gear rim which provides great benefit in reducing impact loadings on the gear teeth and the motor armature, and in turn improving the life of the gears. A patented type of resilient gear designed by Metropolitan-Vickers was used for transmitting the torque to the three driving axles on the Western Region gas-turbine locomotive.

Another design by Alfred Wiseman & Co. Ltd. presents some interesting features. In this arrangement the resilient units consist of three Silentbloc bearings on a common pin, the outer bearing being attached to the hub while the inner bearing is fitted into the gear rim. With this arrangement the flexible bearings are in series and thus greater torsional movements, size for size, are obtained.

Cushioned Radial Loads

The characteristics of this type of bush permit of a limited oscillatory movement, cushioned radial loads, and do not require any lubrication or other attention, make it a very useful fitting for innumerable applications. Switch points are an application of this type, and flexible bearings have been used for this purpose with every success for many years.

The use of this type of bearing in order to provide small reliefs for inevitable movements in dynamic service are also well known, and an instance of such an arrangement can be found in the resilient mounting of the side panelling on the 1,600 h.p. diesel-electric express locomotive built by the Southern Region, at Ashford. The pre-stretched principle of rubber units is also employed for the mounting of such equipment as compressor sets, exhausters, voltage regulators and apparatus of a similar nature.

ELECTRIC RAILWAY TRACTION SECTION

A Year of Decision

THE event of 1956 which dominated electric traction development in Great Britain was the British Transport Commission decision in March to adopt the 50-cycle system. By early August, schemes had been prepared for the electrical equipment of multiple-unit trains and locomotives to meet conditions widely different from any which had been imposed by previous projects of this kind in other countries. These differences lie not only in the traffic density of the lines proposed for electrification, but in the necessity for the two voltages of 25 kV. and 6·6 kV., the latter being used where clearances are restricted. Much emphasis has been placed on the economies of the light overhead system for 25-kV. electrification. How far estimates will be affected by provision for the lower voltage remains in doubt. It seems possible that the standards necessary for satisfactory current collection at 6·6 kV. will have to be applied to the whole scheme, for the pantograph pressures required on the lower-voltage sections, with their heavier conductors, would presumably be excessive for contact lines as light as those which have been used on 25-kV. systems abroad. Another direction in which practice here may have to differ from that seen so far in industrial-frequency electrification elsewhere is in the spacing of the points of connection with the supply. To avoid unbalance to an unacceptable degree, transitions between phases might be necessary in some areas more frequently than at the distances which have been quoted generally as averages between substations in a 50-cycle scheme. These conditions, however, do not affect the rolling stock equipment, and it is here that designers are likely to be meeting some major problems at the moment. The dual-voltage requirement will call not only for great rapidity in disconnection and reconnection of the equipment and in change-over of the transformer connections as trains run from one section to another, but also for a means of discrimination between the two voltages which will make allowance for possible transitory low-voltage conditions on 25-kV. sections and vice versa.

A parallel may perhaps be drawn between electric traction today and the atomic power industry. This, too, reached a landmark in 1956 with the placing of the first contracts for commercial atomic power stations, and it is noticeable already that higher costs per unit generated are being estimated than when the various projects were in their early stages. Apart from the specialised nuclear techniques, atomic power generation involves the widest possible variety of ancillary electrical services for control, indication, and remote manipulation.

Towards the end of the year contracts were placed with British Insulated Callender's Cables Limited and British Insulated Callender's Construction Co. Ltd. for the design, supply, and installation of overhead conductor equipment for the Manchester-Crewe and Colchester-Clacton sections of the 50-cycle electrification scheme. As reported elsewhere in this issue, contracts valued at £8,000,000 have been announced this week for electrical equipments for multiple-unit trains and for circuit breakers.

In d.c. electrification there was progress during the year both in 1,500-V. and 660-V. systems. The Shenfield-Southend electrification, inaugurated on December 31 and described in our January 4 issue, brought the first example in this country of 1,500-V. multiple-unit stock operating a limited-stop, interurban service. While the General Electric Co. Ltd. electrical equipment of the trains is closely similar to that of the same company's Manchester-Glossop sets, detail improvements have been made in design which should promote efficient maintenance and reliability in operation, such as the accessibility of the contactor interlock contacts from the front of the equipment cases and their protection by Perspex covers. Modifications to the Manchester-Sheffield Bo+Bo locomotives are extending the range of electric braking by bringing the rheostatic system into operation at the speed where previously air braking took over from regenerative. The use of the Magnavolt for the control of rheostatic braking in certain new suburban sets equipped by the English Electric Co. Ltd. for the Victorian Railways was described in our December 21 issue. During the year the Gippsland scheme of the Victorian Railways was completed, the first main-line electrification in Australia; and deliveries began from this country of Co-Co locomotives built by the Metropolitan-Vickers Electrical Co. Ltd. for the second Australian main-line electrification project, that from Sydney to Lithgow in New South Wales. Both these Australian undertakings are at 1,500 V. d.c., a fact which, together with the continuing requirements of the South African Railways for 3,000-V. locomotives, emphasises the importance of maintaining development in direct-current practice in this country. In the Southern Region, British Railways have an expanding 660-V. d.c. system outside the scope of 50-cycle proposals so far made public. New main-line electric stock for this Region, with English Electric equipment, entered service in 1956 (see our August 31 issue), and during the year deliveries began of G.E.C. electrical equipments for 57 new London Midland Region Euston-Watford suburban trains now under construction at Eastleigh. New vehicles, both passenger stock and motor luggage vans, have also been introduced on the Tyneside lines, N.E. Region, with English Electric equipment similar to that of Southern Region stock; and new passenger stock with Metrovick equipments has gone into service on the Mersey-Wirral system of the L.M.R. Normal obsolescence of equipment on other d.c. lines and the general process of modernisation is likely for some years to maintain manufacturing activity for all voltages and systems of electrification now operating in Great Britain.

Fifty-Cycle Electrification in Portugal

ADOPTION of 25,000 V. 50-cycle a.c. for the principal lines in Portugal is one aspect of a comprehensive development plan aimed at making use of the national supply, and securing economy in permanent structures. An article elsewhere in this issue, by Mr. Roberto de Espregueira Mendes, General Manager of the Portuguese Railways, outlines the project.

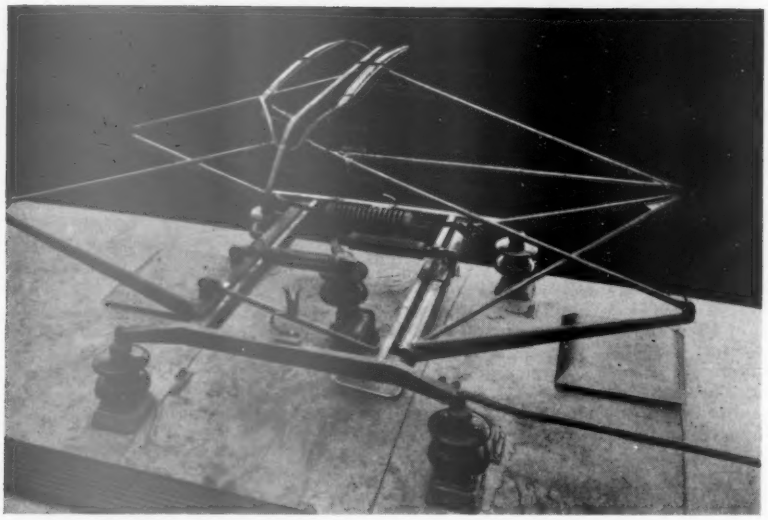
Electrification is involved of the suburban lines of Lisbon and Oporto, and of the main line from Lisbon to Oporto, a total of 242 miles. Included in the project is the section from Lisbon to Entroncamento, the first 65 miles of the main line, used in common by traffic for Oporto, for France (via Irun), and for Madrid (via Marvao). The Lisbon-Oporto main line carries something like half the whole traffic of the system. The work is being carried out by a Franco-German-Swiss group whose members have already established a reputation in various branches of 50-cycle practice, some of them having long experience.

Whilst the suburban lines in the Lisbon area are clearly suitable for electric traction—and there is the precedent of the 16-mile Estoril Electric Railway, largely British-equipped, linking Lisbon with the international resort—it is interesting to find that the suburban area of Oporto, with a population of about 300,000, provides enough traffic to justify electrification. Mr. de Espregueira Mendes points out that a factor in favour of converting the main line was the proximity to it of the main transmission line of the national electric utility company. On the other hand, the problems of telecommunication lines near the electrified railway, and of tunnels and other clearances through structures have had to be solved.

Railway Overhead Contact Lines

Design and construction for high speed working

By Matthias Wittgenstein, Dipl. Ing.,
Kummler & Matter A.G., Zurich



Modern pantograph design by Siemens—Austria

THE sole and exclusive criterion for the quality of a contact line is that it shall give absolutely uninterrupted transfer of current from the wire to the pantograph under all conditions including high speeds. The fact that a number of railways in various countries, after thorough tests and investigations, have decided to use high-voltage single phase alternating current at 25 kV and 50 cycles enables the choice of such lightweight, and hence small bulk, supporting devices and cross sections of wire and cable, to meet this requirement.

Overhead Contact Line

The overhead contact line generally used consists of a contact wire suspended from a catenary by means of vertical hangers, and laterally fixed to the suspension points. To ensure the carbon of the pantograph being worn down evenly, the wire is strung zig-zag, so that it alternates from one side of the pantograph to the other. On the basis of calculations, taking into account both traffic density and weight of trains, the following copper cross sections were arrived at:

Main cantenary for through main stretches	0·101 sq. in.
Main cantenary for sidings	0·082 sq. in.
Contact wire for through main stretches	0·166 sq. in.
Contact wire for sidings	0·14 sq. in.

As not only the contact wire, but also the catenary, is included in the electrical cross sectional area, the hangers already mentioned must be electrically conductive. The maximum travelling speed for which the contact line must be built has been specified by one important authority as 100 m.p.h.

If a cable or wire is suspended at two points with a horizontal mechanical tension, it forms a curve shaped almost like a parabola. If the points of suspension are at equal level, the greatest sag is equidistant from both points, and the horizontal mechanical tension is equal at every point of the cable. Along the curve made by the cable, the vertical weight component bearing down each part of it is greatest at the suspension point—where it is equal to half the weight of cable or wire—and zero in the centre of the span between two poles.

A pantograph of the design generally used today exerts an upward force on the contact wire amounting to from 12 to 24 lb., which causes the contact wire and the catenary to be lifted from the normal position to the working position. The pantograph will raise the wire higher in the middle of the span than under the suspension points, which means that the contact line is elastic at the centre of the span, but remains practically rigid at the suspension points, as shown in Fig. 1. These various degrees of elasticity between suspension point and span centre must be prevented by suitable structural measures, to enable the pantograph to run along at the same level without any appreciable change in the contact pressure.

The pressure of the pantograph lifts the contact wire and the bend or wave, flattens out again at some distance before and after it, see Fig. 2, and, when it is in motion, accompanies it continually. To ensure continuous spark-free current collection and uniform contact pressure, this travelling wave must never be interrupted. The higher the speed of the pantograph, however, the more do additional weights on the wire, e.g., hanger clamps and pull-offs (side-holders) at the suspension points, make themselves noticeable through increasing mass inertia in the form of so-called hard points which interfere with, or deform, this wave and cause irregularities in the contact pressure; even sparking in extreme cases. The weight of the hanger clamps and pull-offs must consequently be kept to a minimum, and correctly suspended.

A phenomenon in connection with this wave action is the fact that the upward bend of the contact wire is more pronounced at low than at high speeds, during which the mass inertia of the contact wire gradually increases. This effect of the contact line elasticity

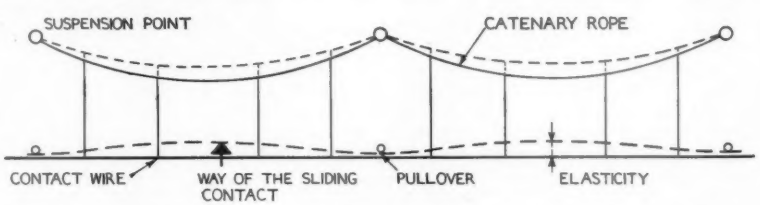


Fig. 1—Normal and working position of the contact wire and catenary

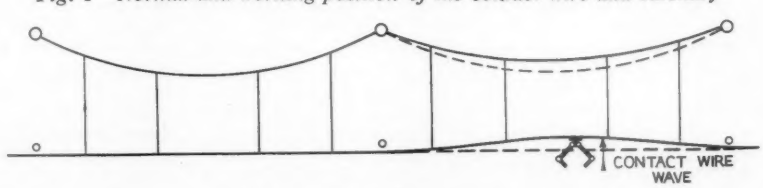


Fig. 2—Contact wire wave

decreasing as the pantograph speed increases is compensated by the raising of the contact pressure by the slip stream.

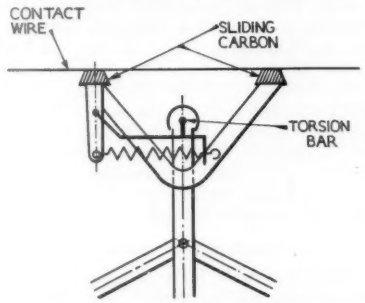
With a knowledge of the dimensions of the sliding collector piece, the lateral wind pressure, the reduced mass inertia of the pantograph and the contact pressure, the engineer first determines the distance between two poles and then calculates the elasticity. On the basis of these calculations, the mechanical tensile forces exerted by the catenary cable and by the contact wire, are equated to one another, and the distance between the hangers established. On this calculation depends the extent to which the elasticity of the contact wire must be increased artificially at the suspension points. Contact lines meeting the high demands made by main line working will most likely require a somewhat more expensive construction than would suffice for those for lower speeds. The length and the prestress of the auxiliary catenary are determined from the elasticity calculation.

Two hangers are attached to the auxiliary catenary, one before and one behind the suspension point, whereby the elasticity of the contact wire is artificially increased at the suspension point. The zig-zag of the wire in relation to the poles results in a pull on the suspension at one pole and a push at the next. Since a side-holder in tension produces a different elasticity from one in compression, it is found necessary to employ what is called the auxiliary tube. This is suspended by two hangers in a V-shape directly from the catenary, and consequently always participates in the temperature-responsive rotations of the brackets. Furthermore, the use of this auxiliary tube enables making the pull-offs at alternate poles short, light, and of equal length; this results in uniform elasticity in spite of the variations in stress due to the zig-zag. The greater elasticity of the contact wire at the span centre is additionally compensated by providing somewhat longer hangers there, producing a pre-sag of the wire at this centre part.

Mechanical Tensioning

Contact wire and catenary cable are subject to temperature-responsive changes in length that affect the sag between suspension points and thereby also the path of the pantograph. On the Continent one still frequently finds contact lines with rigidly strung catenary and a contact wire tensioned by weights. Such forms of construction do not, however, ensure satisfactory contact conditions at speeds of 75-80 m.p.h. or more. The latest specifications require that both catenary and wire be tensioned so as to ensure the same mechanical tensions throughout the year resulting in uniform sag and elevation of the contact wire. The mechanical tensioning devices are located along the open stretches 0·8 to 0·9 mile apart, and as far as possible should not be located in curves. Exhaustive measurements have shown that high mechanical tension of the contact wire results in more favourable contact conditions aid better running of the pantograph, but it can have serious consequences, since the lateral stress exerted on the poles and concrete foundations is also increased, involving considerable extra expense.

An intersection of two wires and also any transition from one length to another in the case of mechanical tensioning constitute particularly difficult problems. The moment the pantograph meets a second contact wire at an intersection, it has to lift double the weight of wire, but since the contact pressure remains constant, the pantograph is pressed downward, and this interferes with the desired horizontal run and, at the same time, with the constant pressure of the sliding piece. In this case too, the elasticity of the contact wire has to be artificially enhanced by a



Springing of the pallette Siemens—Austria pantograph giving even contact and slight mass inertia

suitable V-shaped suspension of the parts of the contact wire adjoining the point of intersection. In this connection the best contact conditions result in the minimum of wear on the contact wire and sliding-contact carbon, because such is directly proportional to the degree of irregularity in contact pressure.

Tests have been carried out by all railway managements using electric overhead contact lines, which have compared the different types of design and construction. Graphs have been drawn showing simultaneously the positions of the points where the pantograph breaks contact with the line and also its up-and-down motion at different speeds. Attempts to measure the contact pressure itself by suitable instruments have so far been without result; the dead weight of such apparatus, which has to be attached to the sliding piece of the pantograph, invariably distorts the results.

Pantograph

Although the pantograph belongs to the electric locomotive, it is closely related to the contact line, both statically and dynamically, as explained. Consequently, the contact-line engineer includes the roof of the locomotive when designing. To be capable of planning his line system in the first place, he must have the principal facts relating to the pantograph. This information consists primarily in the contact pressure, and in the breadth of the sliding piece employed. In addition to this, however, there is the lateral deviation due to the stress exerted by cross winds. This factor determines the maximum distance between poles along straight stretches, because the lateral deflection of the contact wire by the wind must never be great enough to prevent the wire from remaining within the useful range of the sliding piece. The breadth of the sliding piece is the decisive factor governing the distance between poles on curves, where the contact wire must move within the useful breadth of the sliding piece, regardless of lateral wind effect. The zig-zag makes the contact wire wander from one side of the pantograph to the other and back and the speed at which it does so must be kept within a certain limit whilst the sliding piece must not be too strongly arched, as the sideward motion would otherwise make the contact wire fly off it. Another important criterium for the design of a pantograph is its mass inertia. The ability of the sliding piece to accelerate vertically should be as high as possible at the given contact pressure.

Apart from dynamic factors, the pantograph must meet the given requirements as to mechanical stresses. These can reach very high values at high speeds due to the uneven motion of the vehicle and, above all, to the counter-wind. The pantograph, on account of the lateral shaking it is subjected to, should have the greatest lateral stability possible. The slipstream—and particularly the upwind produced by the front fairing of the locomotive—creates an additional but undesirable contact pressure. Although every electric locomotive is provided with two electrically parallel pantographs, Austria and Switzerland have adopted the practice of using only the rear one (in relation to the direction of travel). At this point the counter air current has subsided to such an extent that it streams along parallel to the roof of the locomotive, and the additional pressure is therefore much reduced. A further advantage in operating with only one pantograph, is that the constant conditions under which the overhead line then works are not disturbed, and the reciprocal effect on the dynamics of the line of two pantographs is avoided.

Completed Scheme

The final scheme, in which all the suspension points, mechanical tensioning devices, supporting yokes, etc., together with all necessary measurements are taken into account, is drawn up with the aid of accurate route maps and traverse sight lines of the lengths of line and stations, after the construction engineer has personally studied the route in detail. This planning has to be done with the closest attention to detail and accuracy, and conse-

quently represents the main contribution to the whole project. From the care and accuracy with which it is accomplished depend the smooth supply of material and, above all, the organisation of the erection work. In the case of electric lines for railways, the erection as such is handicapped, first of all, by the fact that the work extends over many miles, rendering inspection and supervision and organisation more difficult.

Secondly, traffic density in certain countries leaves only little time between trains for the erection gangs to accomplish the necessary assembling and adjusting work on the contact line which has to be minutely planned and organised beforehand. This factor is especially decisive in choosing the system of overhead line to be employed. There exist today other systems, besides the one described, possessing excellent current collection characteristics, but they take a considerable time to install and cannot be considered in the case of railways having a close train headway.

Just as it takes more than mere theory and a few drawings to design and construct a machine, the sound planning, engineering and construction of a contact line for high speeds requires a large measure of feeling and instinct. It would be practically impossible theoretically to evaluate and structurally determine such complicated dynamic processes which are necessary for the satisfactory operating of electric contact lines.

Here too, the final finishing touch is of the same vital significance as is the seemingly unimportant last adjustment that an old experienced foreman makes in a machine.

Underground Line for Istanbul

Rubber-tyre trains to run on initial six-mile line

EDITORIAL reference was made in *The Railway Gazette* of October 1, 1954, to plans for an underground electric railway at Istanbul, after a study mission by engineers from the Régie Autonome des Transports Parisiens (R.A.T.P.) and the Société Générale de Traction et d'Exploitation (S.G.T.E.), the former Paris Metropolitan Railway Company, and the contract for its construction was subsequently awarded to the S.G.T.E. Similar studies missions have been made for other large cities, including Calcutta, Montevideo, Rio de Janeiro, and Montreal.

For Istanbul, the plans envisaged a line running underground from Mecidiyeköy in the north-eastern sector of the city to Karaköy on the north bank of the Golden Horn, which would be crossed by a bridge—the method used by the Paris Metro for most of its crossings of the River Seine; the unstable nature of the soil near the Golden Horn makes tunnelling difficult. From Eminönu on the south bank, the line would run underground to Yenikapi, the site of the future main-line terminus of the European lines of the Turkish State Railways.

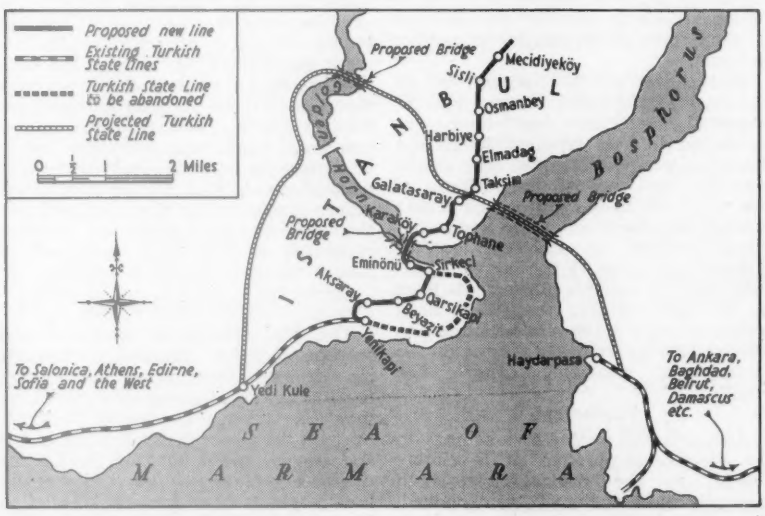
In February, 1956, the draft plans were handed over to the city transport authorities, and contracts are now to be placed for the detailed construction work. This should commence shortly and it is hoped to have the line in operation by the end of 1960.

Rubber-Tyre Trains

The line will have a length, when completed, of six route miles, with a total of 13 intermediate stations; the overall timing for stopping trains is to be 28 min. As mentioned in our editorial note, it is proposed to operate rubber-tyre trains; these will be composed of from four to six vehicles, each of which will have capacity for up to 130 passengers.

At present-day prices, the cost of construction, including the purchase of land, is expected to be about £20,000,000, of which £3,000,000 is in respect of the bridge over the Golden Horn; it is intended that this bridge shall also be equipped for two-way motor and pedestrian traffic.

This line is only the first stage of development in an underground railway system for Istanbul. No information is available as to what connection, if any, is to be made with the electrified line of the Turkish State Railways westwards from Yenikapi, nor with any line which may be built over the projected bridge over the Bosphorus to link up with the State lines in Asia Minor.



Existing and proposed railways in Istanbul and environs, showing location of Bosphorus bridge and connecting line

GRIMSTON STATION TO CLOSE.—The London Midland Region announces that Grimston Station, between Old Dalby and Melton Mowbray, is to be closed on February 4. Passengers should book to Melton Mowbray or Old Dalby, whence buses are operated by Barton Transport. Parcels and passenger train merchandise will be dealt with at Old Dalby and alternative arrangements will be made for freight, livestock, and coal traffic.

ENGLISH ELECTRIC IN 1956.—A noteworthy aspect of 1956 for the English Electric Co. Ltd. was the number of repeat orders received for locomotives and equipments. In addition to electric train equipments for the Southern Region of British Railways and 400-h.p. diesel-electric shunting locomotive equipments for the British Transport Commission orders for the year included a repeat of 2,000-h.p. diesel-electric locomotives for Rhodesia Railways and of 3,000-V. 2,000-h.p. electric locomotives for South African Railways. Deliveries during the year included diesel-electric equipments for shunting locomotives for the B.T.C., diesel-electric shunting locomotives for the Netherlands, diesel-electric coach equipments for the Southern Region of British Railways, and 750-h.p. diesel-electric locomotives for New Zealand, Australia, and Jamaica. Deliveries have continued also of 3,000-V. electric locomotives for South Africa and 1,500-V. coach equipments for the Victorian Government Railways.

Electrification of the Portuguese Railways

Introduction of 25,000-V. 50-cycle a.c. system

By Roberto de Espregueira Mendes,
General Manager, Portuguese Railways

A PRELIMINARY study, prepared some years ago, indicated that it was feasible to electrify the Lisbon and Oporto suburban lines as well as the main Lisbon to Oporto line of the Portuguese Railways (C.P.), at 3,000 V. d.c. For various reasons, this programme could not be carried out and it was only in 1953, on formation of the development plan for the railways, that it was possible to resume the studies already started.

Meanwhile, research by the French National Railways in co-operation with leading European manufacturers had shown the advantages of electrification at 25,000 V., 50 cycles a.c., using the national supply. Another point in favour was that the main power transmission lines of the Companhia Nacional de Electricidade ran roughly parallel with the railway. It remained only to determine whether the single-phase load of the railway substations did not unduly unbalance the three-phase network. New studies, undertaken in that connection in close co-operation with the electricity supply company showed that the use of 25,000 V., 50 cycle a.c. was quite possible.

The following factors, involving considerable additional outlay, had to be considered:

(*a*) The need of replacing all the telegraph and telephone lines parallel to, or in the vicinity of, the sections to be electrified by cable form, or, alternatively, to alter their layout. The former solution which is technically preferable, giving increased safety and a considerable reduction of maintenance costs, was chosen by C.P. for its own lines of communication.

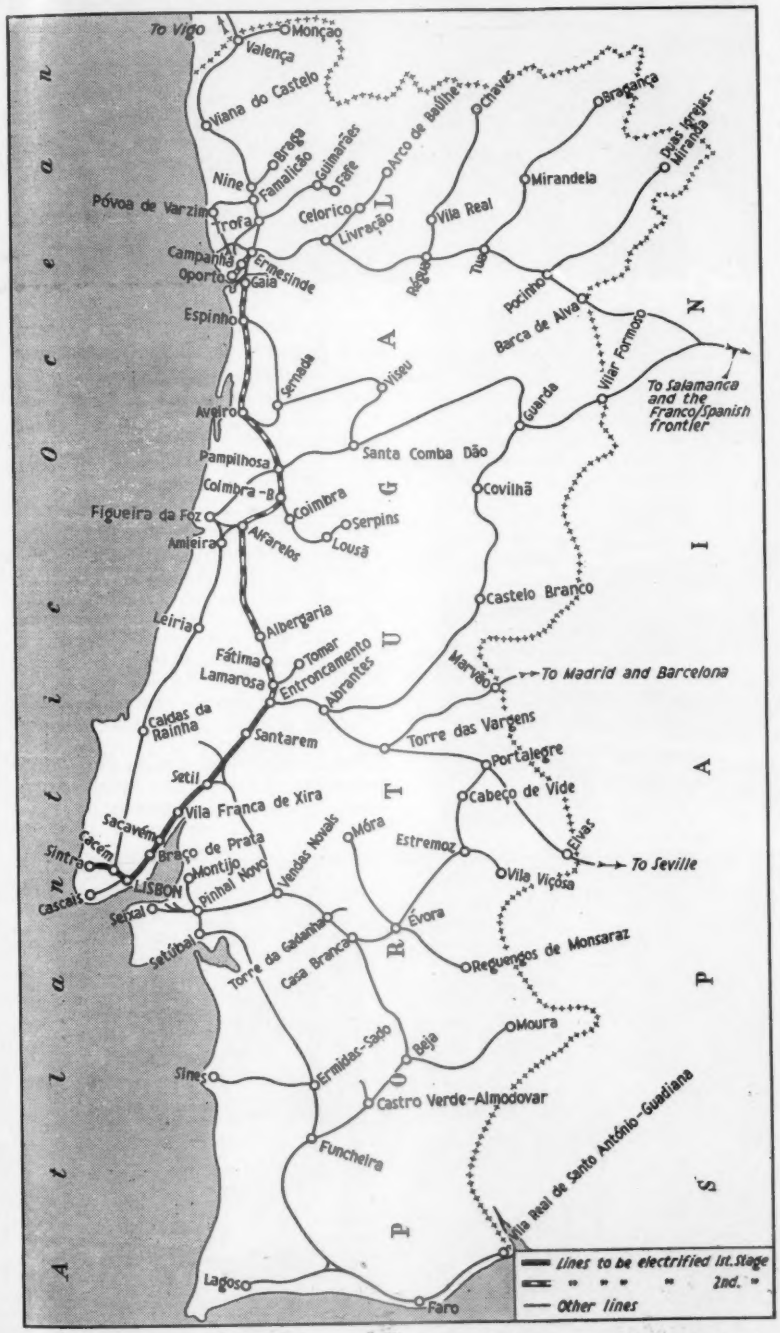
(*b*) The possible need to lower the level of the track in the tunnels and structures, to obtain safe clearances.

In Portugal, the volume of work of this kind did not affect the financial aspect to any great extent, and mainly involved the Rossio tunnel, about 1¼ miles in length, where an average lowering of 1½-2 ft. was needed in the level of the track, with the construction of a reinforced concrete sill about half a mile long.

The electrification of the Lisbon and Oporto suburban lines and the Northern Line between Lisbon and Oporto will be carried out in two stages. The first, at present in progress, concerns the Sintra branch and the Northern line up to Entroncamento, 88 miles of double track and about 4 miles of single track, and the second stage, Entroncamento-Oporto-Ermezinde, comprises about 135 miles of double track and 15 miles of single track.

Rolling Stock

For the first phase of the electrification programme 15 Bo-Bo locomotives and multiple-unit trains were ordered from various builders, as recorded in *The Railway Gazette* of May 13, 1955.



Portuguese Railways, showing the first and second stages of electrification

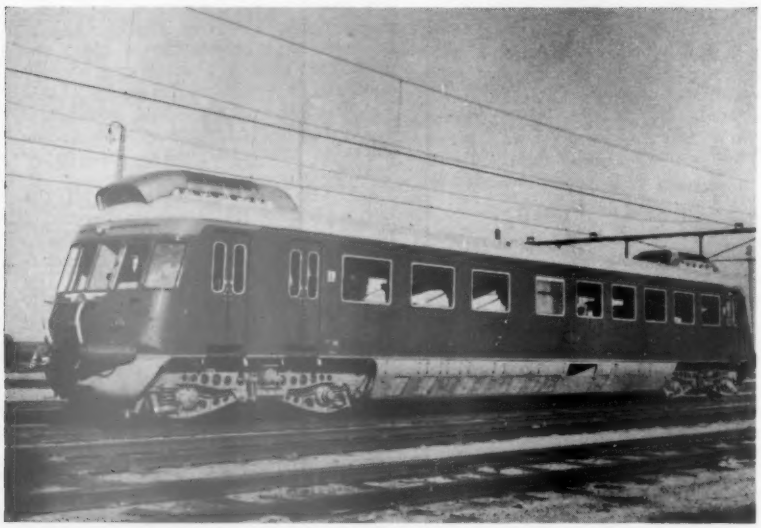
Each locomotive has two cabs and weighs about 70 tons, with a continuous rating of 2,500 h.p. at 40 m.p.h. and a one-hour rating of 2,700 h.p. at 39 m.p.h. As a universal locomotive capable of hauling fast trains at 75 m.p.h. or heavy freight trains at low speeds was desired, a mono-direct traction system was chosen, with the current rectified by a monode tube ignition type rectifier. This locomotive is designed for the following maximum performances: to haul a 400-ton passenger train at 75 m.p.h. on a level track; to haul the same train at 56 m.p.h. on a 1 in 71 grade track, or on this same track to haul a 500-ton freight train at 42 m.p.h.; to haul an 800-ton freight train at 33 m.p.h. on a 1 in 111 grade track.

These three-car sets of stainless steel construction, to the Budd patent, are to be used on the Lisbon suburban service. Each comprises one motor coach with a continuous rating of 1, 360 h.p. at 39 m.p.h. and one-hour rating of 1,500 h.p. at the same velocity, one trailer, and one control trailer, which can be coupled to give six- or nine-coach trains.

The new stock features Scharffenberg central automatic coupling; compressed-air braking with rheostatic braking in the motor coach; fluorescent and emergency lighting; porous-rubber padded benches in the first and second classes; sliding doors with an automatic shutting device; and electric heating. The interior has been panelled, as far as possible, with light-coloured plastic materials that are easy to wash.

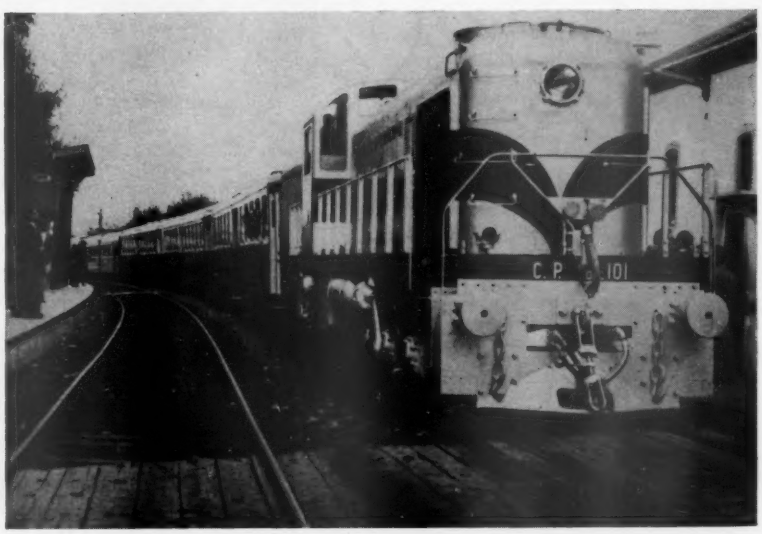
Each coach has two wide doors for the passengers and the three-units seat 89 passengers in the first and 211 in the second class and can eventually accommodate 200 standing passengers, making a total of 500. Deducting the delay in the stops, it is anticipated that

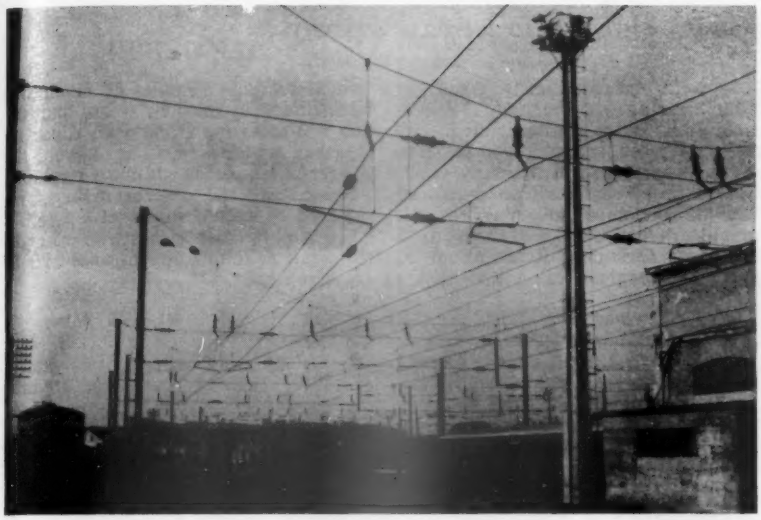
Above: Three-car Fiat diesel express, the "Foguete" on Douro viaduct near Oporto; these trains cover 217 miles from Oporto to Lisbon in 4¼ hr.



Left: N.V. Allan diesel-electric railcar

Below: Main-line train at Entre-Campos (Lisbon) hauled by Alco diesel-electric locomotive





Lightweight overhead equipment at Campolide Station, in the Lisbon area

Lisbon Rossio to Sintra (17½ miles) or return with 12 intermediate stops, will take about 29 mins.; and Lisbon Rossio to Vila Franca de Xira (23 miles) or back with 17 intermediate stops, 39 min.; representing a considerable improvement on the old schedules.

Substations

In the total design five substations are planned at distances of 50-60 miles; two of them, located at Santa Iria and Entroncamento, are to be built in the first stage. Santa Iria substation is located before the Companhia Nacional de Electricidade substation from which it receives 30,000 V. three-phase current through two cables, with a capacity of 10 MVA. The three-phase current is transformed into two-phase 25,000 V. current (two single-phase branches separated by a neutral section) by means of Scott connected 10 MVA transformers. This is the only substation of the interior type with transformer work-shop; the other substation with a primary voltage of 60,000 V. being of the external type.

The Entroncamento substation is to be fed from the Castelo do Bode power station by two three-phase 60,000 V. lines. The three-phase current is transformed in two-phase 25,000 V. (2 single-phase branches separated by a neutral section) by means of Scott connected 10 MVA transformers. Tele-control and tele-measurement from the end substations are planned in the final design.

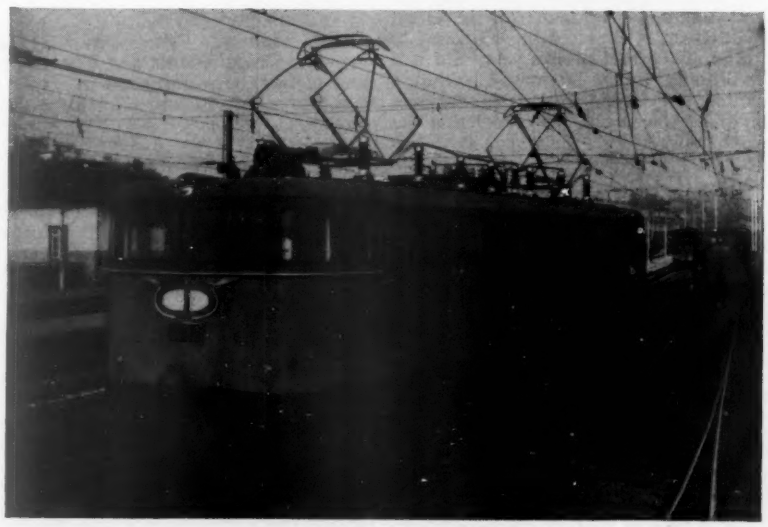
Overhead Equipment

The overhead equipment includes all the material for the transport and distribution of the electric current to the pantographs of the locomotives in the best safety conditions. A light catenary of polygonal type was preferred, made up of a bronze cable with a cross section of ·014 sq. in. from which the checkered copper contact-wire with a cross-section of ·177 sq. in. hangs by means of suspensions placed 30 ft. apart. The height of the contact wire above the rail head is 19 ft. in the open, but can be decreased to 16 ft. in tunnels and overline bridges. Stresses in the carrying wire and in the contact wire are controlled by means of counter-weight stretching devices placed along the track, about ¼ mile apart, in order to obtain constant stress figures of about 1,000 kg. A system of mechanical independence of the double tracks was adopted, providing safety and easier maintenance, and in the stations, where many lines are concentrated between the tracks and unobstructed visibility is essential, flexible frames were selected spanning up to 131 ft.

Between the Santa Iria substation and the Campolide station, two feeders supply current direct to the Sintra line, increasing operational safety. By means of cut-out and shunting posts the loads are adequately distributed for the different overhead lines and each section can be independently cut out for repair, and for the same reason overlap sections are provided at the stations.

Signalling

To derive the maximum profit from the electrification with maximum safety, the C.P. purchased automatic block equipment giving a 3 min. headway. The new equipment consists of an automatic block between Lisbon Rossio Sintra and Entroncamento; adaptation of the present block stations of Rossio and Campolide; construction of new block stations at Amadora, Queluz, Cacém, Sintra, Santa Apolónia, Braco de Prata, Sacavén, Vila Franca and Entroncamento; the locking of block signals with the hand-operated points in the stations, turnouts between stations, by means of "Bouré" locks; and signalling at level crossings. On the Campolide-Sintra-Vila Franca de Xira lines, track circuits are fed by 1,000 cycles a.c. supplied by electronic valves, and between Lisbon Rossio and Campolide by 125 cycles a.c., but the Vila Franca and Entroncamento line is fed by d.c. Central block stations are being mounted at five of the major stations with an all-electric interlocking system. At the remaining stations the points are hand-operated, and are locked by means of Bouré type locks, the interlocking of the points with the signals being obtained through electromechanical central locks. Optical and acoustic signals indicate the approach of trains at level crossings which are also equipped with international highway signals automatically controlled by the trains.



Bo-Bo locomotive for main-line services

Progress on the Cape Midland Main Line

Civil engineering measures to increase capacity

COMPLETION of all improvement work on the 183-mile Port Elizabeth-Cradock section of the Cape Midland line to the interior, scheduled for early 1958, will bring to an end one of the major works undertaken by South African Railways & Harbours as part of a plan to increase carrying capacity and to make railway working easier. By the end of August, 1956, £8,217,763 had been spent on this project out of a total of £9,953,858 sanctioned for the work.

The distance by rail between Port Elizabeth and Cradock will be reduced by about 11¼ miles, curvature reduced by 10,012 deg. and 1,089 ft. rise and fall eliminated. This will convert the route from one of the most difficult to the easiest between the coast and the interior. Heavier train loads will be possible resulting in quicker clearance of the railway traffic to and from Port Elizabeth.

Work started in 1950 with the deviation and regrading of the section between Groenheuwels and Cookhouse. The Golden Valley deviation of about 126 miles was opened on June 8, 1952, followed by the Sheldon-Long Hope deviation on May 12, 1954, and the final section between Groenheuwels and Sheldon was brought into service on November 4, 1954. On completion of this section, men and equipment moved forward to the sections north of Cookhouse and the first of these, the Cookhouse-Witmos deviation was opened to traffic on July 25, 1956.

The new Doringkom deviation, just north of Alicedale, is expected to be completed during 1957, and this will end all regrading work between Port Elizabeth and Witmos.

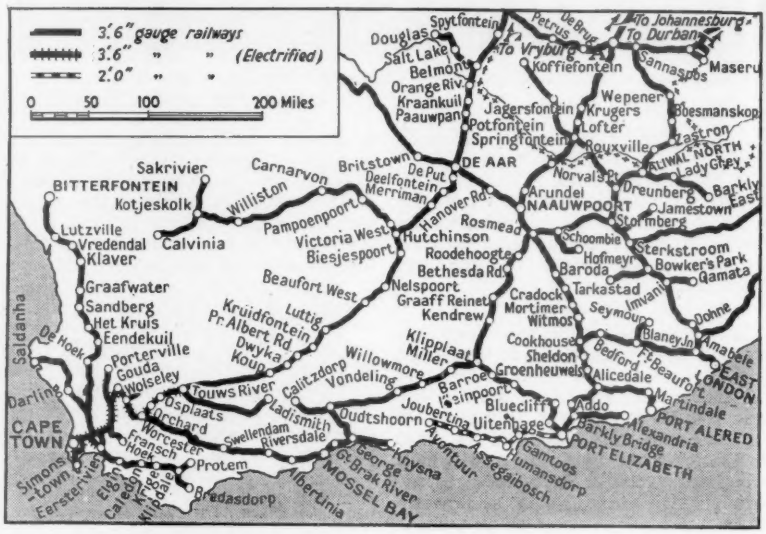
The Witmos-Drennan section, which will include a tunnel over 3,000 ft. long, and four major bridges over the Great Fish River, is expected to be opened to traffic at the end of this year, and will be followed by the Drennan-Cookhouse section, on which work is in progress on three deviations, so completing the work between Port Elizabeth and Cradock.

Increased Loads Possible

The Class "12" engines that have been in use for many years, haul 400-440 tons each over the steep 1 in 40 grades, but will be able to haul 910 tons each, once all the improvements have been completed, while the more powerful Class "15F" engines will take 1,030 tons each; an improvement of over 300 per cent. The resultant reduction in operating costs will be considerable.

The section between Port Elizabeth and Noupoort was originally constructed with many sharp curves and steep gradients of 1 in 40 uncompensated, with the result that either train loads were uneconomically small, or double-heading was necessary if appreciable loads were to be hauled. As traffic increased, an improvement programme was started in the early 1930s, and the line was rebuilt to grades of 1 in 80 uncompensated, with easier curvature from Port Elizabeth to a point near Bushmans River, about 82 miles; but progress was halted by the war.

After the war the position was reviewed, and it was decided to reduce all gradients to 1 in 80 uncompensated and that all curves should have a minimum radius of 1,320 ft. in the more mountainous areas, and 1,650 ft. over easier country. The new section between Groenheuwels and Cookhouse has, in fact, been improved to a ruling gradient of 1 in 80 compensated in both directions.



Railways in the Cape Province; the Cape Midland main line runs northwards from Port Elizabeth

Tunnels

There are five tunnels on this particular deviation between Groenheuwels and Sheldon, the total length being a little more than two miles. The longest, 4,067 ft., was built at a cost of £700,000 and is at present the longest in use in South Africa.

The existing line between Cookhouse and Drennan runs along the west bank of the Great Fish River, and apart from the operating difficulties over this section caused by the many sharp curves and steep gradients, services have often been interrupted by landslides and boulders rolling on to the lines from the mountain slopes. To remedy these conditions it was decided to re-locate the whole of the line. Three tunnels totalling 1¼ miles in length will be included in the new work, and the line will cross the Great Fish River no less than six times in order to avoid the danger of landslides and loose boulders. At each of the river crossings, reinforced concrete bridges of up to six 60-ft. semi-circular arches with a height from rail to foundation of about 90 ft. are being built.

Power-Feed Drills

The original method of drilling was done by means of hand-held pneumatic drills and the broken rock loaded into cocopans by means of two small compressed air-driven mine-car loaders. Working 24 hr. a day and 5½ days a week, progress was at the rate of 170 ft. a month, with a best month of about 270 ft.

This obsolete method of drilling was replaced towards the end of 1952 by the most modern methods, using more efficient equipment. The hand-held drills were replaced by 11 power-feed drills mounted on a drill carriage. Holes 14 ft. deep in place of the former 8 ft. were drilled, while electric delayed-action blasting supplemented the old safety fuse method. Removal of the rock was also modernised by the introduction of larger mine-car loaders. Cocopans of four cubic yard capacity were used instead of the older one cubic yard type, and were hauled away by fast moving electric locomotive... Progress improved from 170 ft. to 600 ft. a month with a best month of about 639 ft., while concrete lining increased from 350 ft. to an average of 1,534 ft. a month.

RAILWAY NEWS SECTION

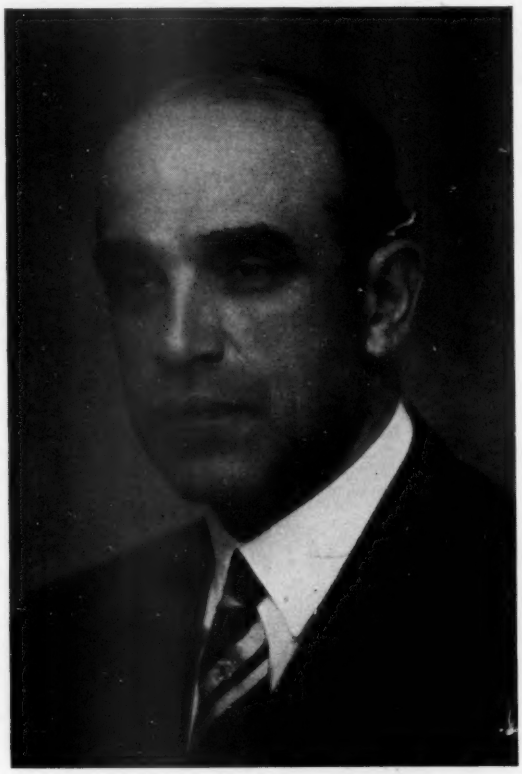
PERSONAL

Mr. Reginald F. Hanks has been appointed a part-time Member of the British Transport Commission.

Mr. John Frederick Pascoe, B.A., Chairman & Managing Director of British Timken Limited, who, as recorded in our January 4 issue, has been awarded a Knighthood in the New Year Honours List, was educated at Exeter School and St. John's College, Cambridge, where he attained Honours in Mechanical Science (Engineering). During the 1914-18 war he served in the Duke of Cornwall's Light Infantry and the Indian Signal Service. He joined the board of British Timken in 1930, became Managing Director in 1940, and Chairman & Managing Director in 1951. He is also Chairman & Managing Director of the Fischer Bearings Co. Ltd.; Chairman of Aberdare Cables (Holdings) Limited, Aberdare Cables Limited, Aberdare Engineering Limited, South Wales Switchgear Limited, and Chapelfoot Finance Co. Ltd. He is also President of S. A. Francaise Timken and a Past Secretary of the Electrical & Railway Finance Company. He is a Freeman of the City of London, being a Liveryman of the Worshipful Company of Tin Plate Workers *alias* Wire Workers of London; a Member of the National Council of the Aims of Industry Limited; a Member of the Policy Committee of the Central Office of the Conservative Party, and he serves on the Council of the Order of St. John of Jerusalem for Northamptonshire & Huntingdonshire. He is a Member of the Regional Advisory Council for the Organisation of Further Education in the East Midlands; a Past Chairman of the Kettering Division of the Conservative Association, and President of the Annual British Timken Show. Mr. Pascoe also serves in a presidential capacity on the councils of numerous associations devoted to various branches of sport.

Mr. J. F. Pascoe

Chairman & Managing Director, British Timken Limited, who receives a Knighthood



Mr. Roberto de Espregueira Mendes

General Manager of the Portuguese Railways

Mr. H. G. Bowles, Principal Assistant to the General Manager, Western Region, British Railways, has been appointed Assistant General Manager (Administration), Western Region.

An incorrect statement was published in the editorial entitled "B.T.C. Welcomes Fresh Outlook" which appeared in our last week's issue. We stated that the newly-appointed Electronics Advisory Panel of B.T.C. officers is under the direction of Mr. G. H. Hinds, Electronics Advisory Officer, British Transport Commission. The Panel is actually under the chairmanship of Mr. C. C. Inglis, Chief Research Officer, B.T.C. The illustrated biography of Mr. Hinds which was publised in the Personal Section of the same issue was correct.

Mr. C. J. Hind has been appointed Chief Engineer (Engines), Ruston & Hornsby Limited. He succeeds Mr. J. D. Thorn who has taken up a position with the United Kingdom Atomic Energy Authority Industrial Group at Risley.

Mr. Roberto de Espregueira Mendes, General Manager of the Portuguese Railways, was born on April 8, 1899, and graduated in civil engineering in 1922, subsequently preparing for graduation in mathematics and electrical engineering. In 1923 he was appointed Assistant Professor of Physics at the Faculty of Sciences of Oporto, and, in 1926-27 occupied a chair in the same Faculty. In 1925 he was admitted by competition as an engineer in the Caminhos de Ferro do Estado (formerly Direcção do Minho e Douro), passing to the Companhia dos Caminhos de Ferro Portugueses in 1927, when the state railways were leased to that company. In May, 1933, he joined the Direcção-Geral dos Edifícios e Monumentos Nacionais for which body he supervised the construction of the present building of the Mint and remaining there until June 7, 1938, as Deputy-Engineer. In November, 1934, he became President of a committee engaged in the design and construction of new buildings for post offices. He was a member of the jury of the competition for the monument to Prince Henry the Navigator in 1936. In June, 1938, he was appointed Under-Secretary of State for Public Works & Communications, being confirmed in the same post after the death of the Minister Duarte Pacheco in 1943. He was appointed General Director of the Portuguese Railways in the session of March 26, 1947, having taken office on April 9 of the same year. As a leading railway manager, Mr. Mendes has re-

presented Caminhos de Ferro Portugueses in missions abroad, and, as a railway expert, has accompanied the Minister of Communications to the annual meetings of the European Conference of Ministers of Transports. In 1948 he became a member of the Supreme Council of the Portuguese Red Cross by invitation of the Minister of War. He is a "Grande Oficial" of the Order of Christ, and was recently awarded the Legion of Honour.

We regret to record the death, at the age of 85, of Mr. J. B. Stephens, General Manager of the Great Northern Railway (Ireland) from 1926 to 1939, and Deputy Chairman of that system, 1939-40. Mr. Stephens, who was associated with the G.N.R.(I.) for over 50 years, was born in Kilkenny and educated in Corrig School, Dun Laoghaire. From 1885 until 1890 he served an apprenticeship under the then City Surveyor of Belfast. He subsequently became Junior Assistant in the Chief Engineer's Department of the G.N.R.(I.). Mr. Stephens obtained much parliamentary experience in connection with the Great Northern Railway (Ireland) Acts of 1892 and 1897, and, in 1900, he was promoted to be Assistant to the General Manager, a position he continued to hold until 1919. In that year he was appointed Secretary & Assistant General Manager. He took a leading part in the wages adjustments and revised conditions of service effected under the directions of the Ministry of Transport, and acted as advocate for the associated companies before the Irish Railways Wages Board. He was appointed General Manager in 1926, was co-opted to the board, and elected Deputy Chairman, retiring the following year. Mr. Stephens took an active part in the investigations into the position of transport in the North. He was keenly interested in the work of the Railway Benevolent Institution.

Lord Broughshane has been elected a director of the Costa Rica Railway Co. Ltd.

Field-Marshal Lord Alanbrooke has resigned as Deputy Chairman and from the board of the Triplex Safety Glass Co. Ltd. on medical advice.

The late Mr. J. B. Stephens
General Manager, G.N.R.(I.), 1926-39,
Deputy Chairman, 1939-40

We regret to record the death on January 9, at the age of 65, of Major Clarence Roy Turner, C.M.G., formerly General Manager, Gold Coast Railways. Major Turner was born at Adelaide, South Australia, and educated at Brompton School and the Adelaide School of Mines. During the 1914-18 war he served with the Australian Forces at Gallipoli and in France and was mentioned in dispatches. He joined the Great Southern Railway of Spain in 1919, with which system he served until 1923 when, he went to Nigeria on railway construction work. Two years later, he joined the Gold Coast Government Railway, and became subsequently Assistant Locomotive Superintendent, District Locomotive Superintendent, Running Superintendent, and Chief Mechanical Engineer. He was appointed General Manager & Harbour Authority in November, 1942, and retired in October, 1947, the year he was made a C.M.G.

Mr. G. C. Tuvey, B.Sc., (Econ.) has been appointed Sales Manager of Zwicky Limited.

Mr. A. F. Lucarotti, D.F.C., T.D., A.M.I.C.E., who, as recorded in our January 11 issue, has been appointed General Manager, North Borneo Railways, was educated at the Royal Technical College, Glasgow, and at University College, Nottingham. He had six years Territorial service with the Royal Engineers to his credit at the outbreak of the recent war, during which he was seconded to the Royal Air Force. Mr. Lucarotti began his railway career with Tanganyika Railways & Ports Services in 1948 and served for some time as Acting Regional Representative, Dar-es-Salaam, before being posted to East African Railways & Harbours headquarters at Nairobi as Assistant Construction Engineer in 1956. He is due to leave East Africa for North Borneo on January 26.

Mr. A. F. Lucarotti
Appointed General Manager,
North Borneo Railways

Mr. D. B. Wallace has been appointed Manager, Department of Public Relations, Canadian Pacific Railway, succeeding Mr. J. Edgar March, who retired on December 31.

Mr. F. V. Stone has been appointed Assistant to the President of the Canadian Pacific Railway, and Mr. R. C. Barnstead has been appointed Manager of the company's Department of Research.

Following the retirements of Mr. V. Radford and Mr. Andrew Black, and the appointment of Mr. H. E. Osborn as Chief Accountant & Financial Adviser, the British Transport Commission has made certain changes in the organisation of its Finance Department.

These include the appointments of a Chief General Accountant (Mr. F. R. Stockdill,

formerly Regional Accountant, Western Region, British Railways) and a Chief Railway Accountant (Mr. J. Gillespie, formerly Director of Accounts, B.T.C.). The Chief General Accountant will be in charge of the Finance Department in the event of Mr. Osborn's absence, and will have general responsibility for the accounting, statistical, costings and audit work at B.T.C. Headquarters. The Chief Railway Accountant will deal with the general run of railway accounting, statistical and budgetary matters.

The Accounts & Statistics Divisions of the Finance Department are being combined under Mr. W. Harris-Burland (formerly Director of Statistics, B.T.C.) with the title of Director of Accounts & Statistics.

The remaining positions of Directors within the Finance Department are held by the existing officers, namely: Director of Budgets, Mr. W. I. Winchester; Funds, Mr. W. S. Morgan; Costings, Mr. D. M. Dear; and Audit, Mr. F. W. Burton.

These changes involve some consequential appointments, or changes of responsibility and designation, as follows:—

Mr. F. A. Dadge, Assistant Director of Accounts, to be Assistant Railway Accountant.

Mr. E. W. Bratchell, Assistant Director of Budgets (Traffic Revenue), to be Revenue Accountant (Railways).

Mr. H. R. Hill, Senior Assistant, Funds Division, to be Treasurer.

Mr. E. P. J. Lunch, Secretary, Area Management Costs & Statistics Panel Secretariat, Statistics Division, to be (in addition) Assistant Director of Statistics.

Mr. S. J. Birch, Senior Taxation Assistant, Accounts Division, to be Assistant Director of Accounts.

Mr. D. R. Fraser, Senior Budgets Assistant, to be Budget Accountant (Railways).

Mr. F. G. Manning, Senior Assistant, Accounts Division, to be Administration Officer.

The British Transport Commission announces that Mr. D. Murray, Chief Freight Officer, Commercial Department, British Railways Central Staff, has been appointed Assistant Traffic Adviser (Freight) at the Commission's Headquarters.

Mr. B. L. Bell, Assistant District Engineer, Newcastle, North Eastern Region, British Railways, has been appointed District Engineer, Barrow, London Midland Region.

Mr. C. A. Shepherd, Carriage & Wagon Works Manager, Eastleigh, Southern Region, British Railways, as Assistant to Carriage & Wagon Engineer, Eastleigh, in the Chief Mechanical & Electrical Engineer's department.

Mr. R. Paterson, who has held the office of British Railways' Irish Traffic Superintendent since it was created in May, 1952, has retired after 45 years of service. Mr. Paterson controlled the whole of the passenger and freight traffic between Britain, Ireland, and Northern Ireland for the London Midland, the Scottish, and Western Regions of British Railways. His appointment in 1952 brought about a more effective co-ordination of the rail and shipping traffic to and from Ireland and fostered its development over the various shipping routes.

Mr. R. C. Hilton, previously Staff Assistant to the Chief Commercial Manager, London Midland Region, British Railways, is acting as District Goods Manager, London Midland Region at London (Broad Street). He will be responsible for London Midland freight traffic in London and suburban areas as far north as Bletchley and Bedford. Mr. Hilton is deputising temporarily for Mr. G. E. Curtis who has been loaned to the British Transport Commission in connection with British Railways development of freight services. He has much experience of the freight side of railway activities and was Leading Railway Service Representative in British Railways London Commercial Service in 1949.

The following members of the staff of the Chief Civil Engineer, Eastern Region, British Railways, have been elected to associate membership of the Institution of Civil Engineers: Mr. P. E. Heydenrych, Senior Engineering Assistant; Mr. F. S. Proctor, Engineering Assistant.

British Transport Docks announce that Mr. J. V. Snow, Assistant Dock Manager, Newport, has been appointed Commercial & Traffic Development Assistant, Chief Docks Manager's Office, South Wales Docks, Cardiff. Mr. Snow began his career in 1935 with the former Great Western Railway Company at Swansea Docks, where he gained experience in various sections. During the war years he was Secretary of the Swansea Port Emergency Transport Committee and the Port Operational Committee. In 1945 he was selected for a two-year course of departmental training at South Wales Docks after which, in 1948, he received an appointment in the Commercial Section of the Chief Docks Manager's Office at Cardiff. Three years later he became Secretary of the Cargo Clearing House of the Industrial Association of Wales & Monmouthshire and, in March, 1955, was appointed Assistant to the Dock Manager, Cardiff & Penarth Docks. In August, 1956, Mr. Snow was promoted to be Assistant Dock Manager, Newport.

Mr. T. Pooley, Sales Director of Expandite Limited, will leave this country on February 4 for South Africa. He will also visit Rhodesia and East Africa.

Mr. E. S. Lane, Northern Area Sales Manager of the Medical Division of the British Oxygen Co. Ltd., has retired after nearly 39 years of service.

Mr. Harold H. Saint has been appointed Chief Sales Engineer for the Electrical Division of the Expanded Metal Co. Ltd., which covers also the products of its subsidiary, the Cressall Manufacturing Co. Ltd.

Mr. F. M. G. Wheeler, Sales Manager, Railway Division, of British Timken Limited, is flying on January 22 on a visit to India and Pakistan for technical consultations with railway engineers and British Timken distributors in India and Pakistan.

Thos. W. Ward Limited announces the following appointments as local directors: Mr. Ernest Springthorpe, Mr. C. Norman Bradshaw, Mr. Eric Wolstenholme, Mr. George Page, Mr. Reg. Hadfield, and Mr. Alfred Kissack.

The Council of the Institute of Welding has awarded the Sir William J. Larke Medal for 1956 to Dr. D. C. Moore and Mr. E. A. Taylor, of I.C.I. Ltd. for their paper on "The Welding of Copper and Copper Alloys." The following papers received honourable mention: "Some Electrical Aspects of Inert-Gas Shielded Arc Welding," by Dr. L. H. Orton and Mr. J. C. Needham; "Resistance Welding and Post-Heat-Treatment of Steel Stud Projection Welds," by Mr. E. V. Beatson, Mr. E. Mitchell and Mr. L. N. Sayer; "Strains in Flanged Pipes," by Mr. J. W. Davis and Mr. E. J. Heeley; "The Composition of Weld Metal," by Mr. W. P. Van der Blink.

Mr. C. Murray has been appointed Manager (Overseas) of British Insulated Callender's Cables Limited.

Mr. F. Eric L. Bache has been appointed Chairman of Geo. Salter & Co. Ltd. in succession to the later Mr. C. S. Bache.

Mr. H. G. Taylor has been appointed Director of the Electrical Research Association, succeeding the late Dr. S. Whitehead.

The Medal of the Society of Chemical Industry has been awarded for 1957 to Dr. Walter J. Worboys.

Mr. R. E. Allen has been elected a local director to the southern head office board of the British Wagon Co. Ltd.

Mr. H. F. Osborn, Director & General Manager of Vokes Limited, has been appointed Managing Director with effect from January 1.

Lord McCorquodale has been appointed Chairman, and Mr. Lewis T. Wright, Deputy Chairman, of the British Employers' Confederation.

Mr. Norman V. Howard and Mr. Charles W. Hutchinson have been appointed local directors of Thos. Firth & John Brown Limited.

Mr. H. M. Sells has been appointed Field Manager of the Scottish District of British Oxygen Gases Limited. The appointment took effect from January 1, and Mr. Sells will be based at Glasgow.

Mr. J. Hannah recently joined Messrs British Timken Limited and will be taking over as their London Railway Representative on January 21, 1957. Mr. Hannah received his railway training on the L.M.S.R. at Glasgow. He joined the service of the Indian State Railways in 1928, attaining the rank of Deputy Chief Mechanical Engineer before leaving. He joined the West Australian Government Railway service as Chief Inspecting Officer in 1949 and it is this position that he now leaves.

Among other appointments to the new Cabinet which have been approved by the Queen are the following:—

Mr. Harold Macmillan, formerly Chancellor of the Exchequer, as Prime Minister & First Lord of the Treasury.

Lord Salisbury as Lord President of the Council (unchanged).

Mr. R. A. Butler, formerly Lord Privy Seal, as Home Secretary & Lord Privy Seal.

Lord Kilmuir as Lord Chancellor (unchanged).

Mr. Selwyn Lloyd as Secretary of State for Foreign Affairs (unchanged).

Mr. Peter Thorneycroft, formerly President of the Board of Trade, as Chancellor of the Exchequer.

Lord Home as Secretary of State for Commonwealth Relations (unchanged).

Mr. Alan Lennox-Boyd as Secretary of State for the Colonies (unchanged).

Sir David Eccles, formerly Minister of Education, as President of the Board of Trade.

Mr. Iain Macleod as Minister of Labour & National Service (unchanged).

Sir Percy Mills as Minister of Power.

Mr. Harold Watkinson as Minister of Transport & Civil Aviation (unchanged).

(See also editorial in this week's issue.)

NEW EQUIPMENT AND PROCESSES

Insulated Food Trolley

AN electrically heated and insulated trolley suitable for sale on station platforms of hot dishes and other refreshments, or in railway works canteens, or where cooked food has to be transported between departments which are some distance from a cooking centre, is shown in the accompanying illustration. Meal capacities of 40-90 persons are covered by the range of trolleys now being manufactured.

Constructed in heavy-gauge aluminium, the main bodywork is fitted with fibreglass insulation material. The top compartment is covered by hinged stainless steel lids and by means of their plastic handles may be opened to rest on the bumper bar thus forming convenient serving trays. Thermostatic heating is by 750 W., 240-V. elements.

Service, Standard and De-Luxe models providing 40-60 meals are known as the C.40 series and are priced at £95, £120 and £165 respectively. Similar models for 60-90 meals are known by the number C.90 and cost £110, £135 and £180. Additional charges are made for sprung castors on Service and Standard versions, for electric elements and for cream or white enamel finish, which are £12, £21 10s. and £5 respectively. Delivery is eight weeks.

The manufacturer is Grundy (Teddington) Limited, Somerset Road, Teddington, Middx.

Semi-Slewing Mobile Crane

THE Staffa 3 semi-slewing 2-ton mobile crane is expected to prove useful for operating in any location where confined space is encountered. One such application occurred recently at Cannon Street Station, Southern Region, when materials for the extensive rebuilding scheme were offloaded from wagons in a confined space with the minimum headroom. Another use is in transferring a load from one wagon to another on adjacent tracks with only a narrow roadway in between.

This model is a variation of the basic Staffa 3 design. It includes finger-tip controlled hydraulic luffing, small turning circle, and standard car-type controls. One hydraulic ram is used to raise and lower the jib, and another to slew it. The driver has at hand two levers which operate hydraulic valves to select either or both of the rams. An engine driven hydraulic pump supplies the power, and specially developed non-return valves protect the ram units from failure. The hoisting mechanism comprises a fan-cooled worm reduction gear which is mounted on the grooved drum. Power is transmitted by a propeller shaft and chain drive from a marine type forward and reverse box at the rear of the crane, coupled by a further propeller shaft to the engine. The hoist brake is connected directly to the forward and reverse box to give automatic engagement.

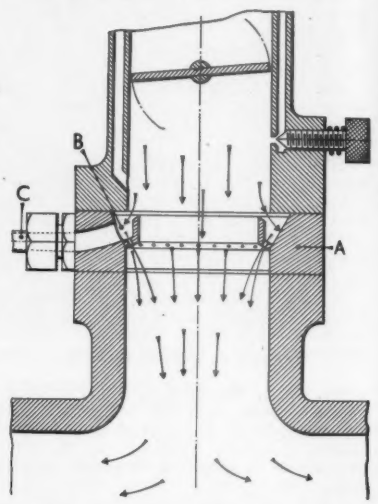
Cranes are constructed on the unit principle, so that major replacements can be supplied in the event of accidents. A jib extension which can give added lift can be supplied.

The price and delivery will be quoted on application to the manufacturer, Chamberlain Industries Limited, Leyton, E.10.

Fuel Economiser for Petrol Engines

THE "G" conversion, suitable for most types of petrol engines, either road or rail transport or industrial power unit types, is designed to decrease the wastage inherent in the induction system of the average engine, and so reduce the fuel consumption.

The fitting is stated to save up to 25 per cent fuel consumed on most units, and



is guaranteed to save at least 10 per cent. It consists of a ½ in. thick duralumin casting (A), which is inserted between the carburettor and manifold at the carburettor flange joint. The hole through its centre is of slightly smaller diameter than that at the lower end of the choke tube; by this means an annular groove (B) is made to trap a proportion of the atomised fuel. Holes in the bottom of the groove allow surplus fuel to continue in an atomised form on its normal path over the hot-spot and through the manifold. About 10 per cent of the total fuel is drawn in cold atomised form down the copper pipes (C), one of which is inserted into each manifold branch at a point as near as possible to the cylinder block. The cooler droplets meet the heated vapour where it is about to enter the cylinder, and immediately vaporise, suddenly assuming nearly four times the cold

volume, thus creating violent turbulence which causes the vapour to burn more evenly and completely; the engine develops greater power and flexibility and less fuel is wasted. No alteration of the carburettor setting is normally necessary after conversion. The fact that the device does not depend upon admitting extra air to achieve the saving is emphasised.

The "G" conversion has been tested on various classes of petrol-driven vehicles by large fleet owners.

The price of a unit suitable for a 10-h.p. 4-cyl. engine is approximately £5 2s. 6d. The manufacturer is L. & R. (Engineering) Limited, Whades Works, Duke Street, Littlehampton, Sussex. Trade enquiries should be addressed to Fuel Conservation Limited, 132-4, Fleet Street, E.C.4.

Head-Fitting Welding Helmet

THE Fleming No. 1686 welding helmet is designed for all welding operations where a head-mounted helmet is desirable so as to leave both hands free, as in repairs to bridges in situ and other overhead work.

As may be seen in the illustration, it is of one-piece construction; the shape has been streamlined to improve comfort and appearance. The deeply curved sides give

good protection against sideflash and reflected radiations. The total weight, with filter and cover glass, is 23 oz.

The glass-holder is of shock-resistant plastic and takes filters size 4¼ in. × 2 in. The coloured filter is of Protex glass to BS. 679/1947, and is protected by a clear cover glass. Filters may be changed or cover glasses replaced quite simply, as required. The headband is lined with a replaceable and washable sponge sweatband. The sponge is soft when damp and non-irritant. The size of the headband is controlled by a hexagonal nut and adjustment to give perfect fitting is achieved by fingertip control. The helmet is also fitted with a chinstrap, which can be adjusted for size, and the helmet remains firmly in position when it is swivelled above the head. The helmet has been made to comply with all the requirements of BS. 1542—Head and Face Protection during Welding.

The price of the No. 1686 helmet is £3 13s. and delivery is ex stock. The manufacturer is Fleming Safety Goggles, 146, Clerkenwell Road, E.C.1.

Reversible Pneumatic Impact Wrench

THE value of air-operated impact wrenches for work such as chairing and de-chairing sleepers, steelwork erection and so on, has been established for some time. The Model CP-610 reversible impact wrench supersedes the previous design, being of less weight and a stated torque output increase of up to 50 per cent over the earlier Model 365. Improved design of the clutch jaw faces and increased clutch efficiency are expected to lead to lower maintenance and a reduction of operating costs because of the less air required.

The Model 610 is fitted with a pistol grip handle and outside trigger. The size of the socket shank is 1 in. square and the wrench is capable of driving bolts up to 1¼ in. dia.

The overall length including square driver is 14½ in. and it weighs 20½ lb.

The price is available on application and delivery is ex stock. The manufacturer is the Consolidated Pneumatic Tool Co. Ltd., 232, Dawes Road, S.W.6.

Portable Frequency Meter

A FREQUENCY meter giving direct readings of frequency from 15 c/s to 100 kc/s, thus covering frequencies used in railway signalling, in six switched ranges is the JT2. The instrument incorporates junction transistors and germanium diodes, and the frequency under test is shown on the linear scale of a moving coil instrument. A high order of accuracy, independent of input waveform within a wide range of applied volts, is claimed. It is mains operated and weighs 9 lb.

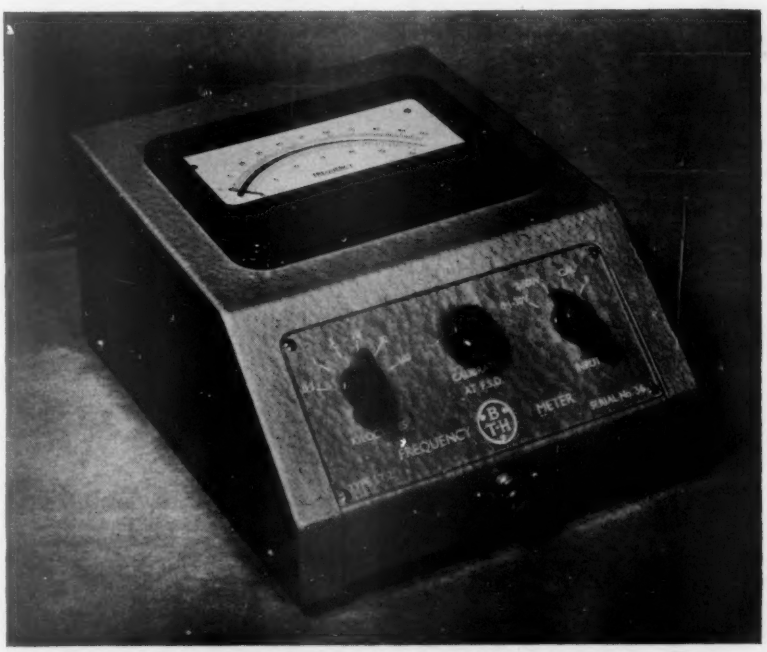
Basically the instrument consists of a saturating transistor amplifier which charges and discharges a capacitator on each cycle of the input voltage. As the mean current through the capacitator is proportional to the input frequency, it can be rectified and shown directly in terms of cycles-per-second on the scale of a d.c. moving coil meter.

Provision is made, with a rotary switch, for selecting any one of six frequency ranges with full scale deflections of 0·3 kc/s, 1 kc/s, 3 kc/s, 10 kc/s, 30 kc/s, or 100 kc/s, respectively.

To maintain the inherent accuracy of the equipment over a wide input voltage range, another switch is provided to select one of two appropriate inputs to the amplifier to suit the applied voltage.

The makers claim a battery life of about 2,000 hr. It is also possible to make use of mains voltage as a source of reference.

The JT2 is available from stock; the price will be quoted on application. The manufacturer is the British Thomson-Houston Co. Ltd., Rugby.



Hadfields Group Activities

A review of recent activity by the Hadfields group of companies over the past year points out that the export side of the Hadfields sales organisation has been considerably expanded of late.

The steady demand for fully-hardened and semi-hard forged steel rolls, for use in rolling mills throughout the world, continues to increase. Valuable contracts of some magnitude have been received and deliveries made to countries which once were the chief sources of competition.

Contracts are also in hand for special trackwork in cast Era manganese steel for tramways overseas and dock railways in Britain, also for special trackwork in rolled Era manganese steel for British Railways and railways in South America.

The forges have been exceptionally busy in latter months, and the 25 hammers and presses, ranging from 60 to 2,000 tons, deal with every class of solid and hollow forging for locomotive and general engineering work. There have been a number of big forgings for electrical machinery, and a demand for the company's range of parts engaged in the extrusion of metals.

A recent development on the forging side of the company has been the making of aircraft forgings in certain of the Nimonic metals. The company has also been actively engaged making special parts for nuclear energy plants. The demand for heat resisting and stainless steels has increased.

Since the acquisition of the Millspaugh group of companies, many innovations and reorganisation schemes have been carried out, and Millspaugh has added considerably to the research and development resources. Examples are the recently opened laboratory and the new foundry for centrifugal castings in stainless steels and non-ferrous metals, as well as the greatly enlarged workshop for steel fabrication.

British Thomson-Houston in 1956

Early last year the announcement was made of the change of plan from the 1,500-V. d.c. system to the 25-kV., 50-cycle, single-phase a.c. system of electrification of British Railways. This change from the previously recommended standard of 1,500-V. d.c. was due to a number of factors, one of which was undoubtedly the advance made in germanium power rectifiers in which the British Thomson-Houston Co. Ltd. has played a prominent part. A 750-kW. unit, the first of its kind to go into traction service anywhere in the world, was installed by B.T.H. in one of the motor coaches on the Lancaster-Morecambe-Heysham 6·6-kV., 50-cycle a.c. single-phase line. Tests were carried out on this equipment during the early part of the year and it has been in regular service on this line since April last with entirely satisfactory results.

Diesel-Electric Locomotives

Work is proceeding satisfactorily on the ten 800-h.p. complete diesel-electric locomotives for British Railways and the 20 sets of power equipment for the 1,160-h.p. diesel-electric locomotives, the mechanical parts for which are being built in B.R. workshops.

During the year the 15 sets of PCM electro-pneumatic camshaft control for the three experimental London Transport trains have been shipped and a further 64 equipments are in process of manufacture. On the second order for the Toronto subway cars, 28 PCM equipments have been shipped, bringing the total number supplied to Toronto to 132. A further six equipments of a new type suitable for rheostatic braking are in course of manufacture.

Electrical and Power Equipment

Orders have been received from the Yorkshire Engine Company and Ruston & Hornsby for electrical and power equipment for a total of 40 diesel-electric locomotives, ranging from 165 to 400-h.p. Two new sizes of Y.E.C. locomotives, 200-h.p., and 400-h.p., have been introduced during the year; these are powered by Rolls-Royce engines, two identical 200-h.p. power plants being used in the larger locomotive. In addition, 23 diesel-electric shunters, in 230-h.p. and 460-h.p. sizes, have been ordered from B.T.H. for ISCON, the British consortium which has obtained a contract to set up a complete steelworks in India.

B.T.H. equipment has been supplied for an experimental diesel-electric transfer car designed for use with coke oven plants. This marks a new development in steelworks equipment which holds out great promise for the future.

Type RP resistor production has continued at a high level and orders received have included an additional 47 sets of resistors for South African Railways locomotives. Large orders for B.T.H. speedometers are in hand, and 160 equipments were ordered for British Railways locomotives during the year.

Maiden Voyage of Eastern Region Train Ferry

The new Eastern Region train ferry, the *Essex Ferry*, made her maiden voyage from Harwich to Zeebrugge with freight for the Continent on January 15. After successful trials on January 8 and 9, the new ship was officially taken over by the Eastern Region and immediately set sail for Harwich, a journey of over 800 miles by way of the Irish Sea, Lands End and the English Channel, arriving at Harwich on January 12.

The *Essex Ferry* was launched by Mrs. C. K. Bird, wife of the General Manager of the Eastern Region, on October 24, from the Clydebank Yard of John Brown & Co. (Clydebank) Ltd., the builders.

Accommodation

Four rail tracks are fitted within the vessel with a combined length of about 1,132 ft. providing accommodation for between 36 and 38 international rail service wagons. The outer tracks total approximately 438 ft. and the inner lines in the middle of the ship 694 ft. long. There is comfortable cabin accommodation for 12 passengers.

The ship is fitted with electrically operated cargo handling gear over the four rail tracks, which is capable of loading containers from rail wagons on to the deck of the vessel or vice versa. Modern navigational equipment includes an echo sounder, Decca navigator, and radar. Besides the modernisation of the train ferry fleet, extensive improvements have been made at the port of Zeebrugge to enable a more efficient service to be operated; in June, 1953, a new terminal in the outer harbour was opened which afforded a reduction in voyage time and consequent speeding up of the service.

Ferry Service

The Eastern Region train ferry between Harwich and Zeebrugge is an international freight service, although cabin accommodation is provided in the ships for 12 passengers, the permitted maximum in cargo vessels. The service provides for the through operation of railway vehicles between Great Britain and most parts of the Continent of Europe.

The service is particularly useful for large pieces of machinery, fragile articles, and perishable goods which can travel throughout under refrigeration.

At lunch at the Parkeston Hotel before the voyage to Zeebrugge, the chair was taken by Mr. S. A. Clavdon, Deputy Shipping Manager and Port Superintendent, Eastern Region. Also present were Mr. W. S. Dawson, Superintendent Marine Engineer, and Captain A. W. Greenham, who took command of the new vessel.

Careers Masters as Guests of B.T.C.

The British Transport Commission acted as host at the Annual Conference of the Public Schools Appointments Bureau, held on January 11 at the Charing Cross Hotel, London. More than 90 public schools' headmasters or careers masters attended the conference.

"Opportunities within the British Transport Commission" was the theme of the morning session, the speakers being Mr. W. P. Allen, Manpower Adviser, B.T.C., Mr. T. H. Hollingsworth, Traffic Adviser, B.T.C., and Mr. A. Dean, Chief Civil Engineer, British Railways, North Eastern Region.

In welcoming the delegates, Mr. Allen said that the "great projects of electrification and dieselisation" on British Railways had made "the future for anyone entering our service. . . as attractive as that of many other industries and, indeed, better than many."

Railways a National Necessity

"Despite the growth of other forms of transport," Mr. Allen continued, "the railways are a national necessity by reason of the great numbers of passengers and the immense amount of traffic still carried by rail. . . . We in British Transport are convinced that the modern railway which is now being built will once again place British Railways in the forefront and will be something of which the public will be proud.

"With this conviction, we are doing all we can to encourage young men to enter the industry and to be in, as it were, on the threshold of big events. Those who enter British Railways now will have the opportunity of helping to build the new modern railway and then operate it. Great changes are taking place and the work is full of excitement and promise.

"We in British Transport must have our fair share of the best products of each level of the eductational system, and to this end we have recently strengthened our contacts with the universities in an attempt to encourage a greater number of graduates to join our service. . . . We now welcome this opportunity of strengthening our contacts with the public schools, because we want to attract more of your young men into our service. We regard the public schools as a

most important source of recruitment for our technical and managerial requirements, and I hope that . . . you will be able to represent to your scholars the attraction of employment in public transport.

Satisfactory Career

" . . . I would like to repeat that British Transport can provide a fascinating and satisfying career, and I hope that . . . we can help you in placing the young men for whom you are responsible."

Other representatives of the Commission or its various management bodies who attended the conference included: Messrs. S. E. Raymond, J. E. Roberts, W. H. Glossop and E. Hopper, B.T.C.; Mr. D. McKenna, British Railways, Southern Region; Mr. H. G. Bowles, Western Region; Mr. G. W. Stewart, Scottish Region; Mr. L. M. Sayers, London Midland Region; Messrs. C. S. McLeod and J. Bonham-Carter, Eastern Region; Mr. F. G. Hole, British Transport Hotels & Catering Services; Mr. K. R. Thomas, London Transport; Messrs. G. R. Hayes and A. Whitfield, British Road Services: Mr. John Donovan, British Transport Docks: and Mr. F. J. Norris, British Transport Waterways.

Thousandth Lodekka Bus

The thousandth Lodekka bus to be constructed since 1953, to a special double-deck design for use on routes with low bridge clearances, was handed over to the Eastern National Omnibus Company on its completion on January 3, 1957, at the Eastern Coach Works, Lowestoft. All the chassis for these vehicles have been manufactured at the Brislington Works of Bristol Commercial Vehicles Limited, and all bodywork by Eastern Coach Works Limited.

The Lodekka type of vehicle was introduced to meet the problem of evolving a standard large-capacity, double-deck bus, capable of economical production, for the many routes with low-bridge restrictions served by the omnibus companies taken over by the British Transport Commission under the Transport Act, 1947. In 1949 the Motor Constructional Works of the Bristol Tramways & Carriage Company (now Bristol Commercial Vehicles Limited) and Eastern Coach Works Limited, (both companies controlled by the B.T.C.) collaborated in the research and design leading to the successful production of the Lodekka prototype. This has an unladen height of approximately 13 ft. 5 in., but without the previous disadvantages of a "low-bridge" side-gangway and of four-abreast seating on the upper deck. It accommodates 60 passengers compared with 55 in previous "low-bridge" types.

Central Gangways

Both upper- and lower-deck seating is arranged with a central gangway providing the regulation headroom, and to achieve this result, and to obtain a lower-deck gangway about 12 in. lower than normal and on the same level as the entrance platform, a considerable re-arrangement was made in the layout of the chassis frame and transmission units. This was achieved without exceeding the normal weight for this class of vehicle. The other main feature of design which enabled the overall vehicle height to be reduced was the elimination of the usual body cross-bearers. The body framework is wholly of light alloy.

Of the 1,000 Lodekka vehicles now in service, 866 have been supplied to 21 companies of the Tilling Group, and 134 to four companies of the Scottish Omnibuses Group.

POLLARD BEARINGS LIMITED.—It is announced that Pollard Bearings Limited have opened their new and enlarged London office at 44, Hertford Street, London, W.1. The telephone number is Grosvenor 1402-3.

At the handing-over ceremony (beginning at fifth from left, and left to right) Messrs. A. W. Hallpike, Director & General Manager, Bristol Commercial Vehicles Limited; R. E. Sugden, Director & General Manager, Eastern Coach Works Limited; S. Kennedy, Chairman, Management Board, Tilling Group of Omnibus Companies; T. S. Gavin, Chairman, and L. E. Richards, Director & General Manager, Eastern National Omnibus Co. Ltd.

Staff & Labour Matters

N.U.R. and A.S.L.E.F. Wage Claims

At a delegate conference of members of the A.S.L.E.F. last week it was decided to accept the decision of the Railway Staff National Tribunal that the rates of pay of footplate staff should be increased by 3 per cent.

The B.T.C. and the A.S.L.E.F. have now both accepted the decision. The N.U.R. claim for a 10 per cent increase for all railway conciliation staff is to be discussed at a meeting of the Railway Staff National Council today (Friday).

T.S.S.A. "Sliding Scale" Proposal

At a meeting of the Railway Staff Joint Council on January 10, the T.S.S.A. made its submissions as to the rates of pay of railway salaried staff, and the Commission undertook to consider the representations made and give an early reply.

It is understood that the Association proposed to the Commission a sliding scale, in the upward direction only, of salary increases linked to the cost of living.

Contracts and Tenders

Further contracts in connection with the electrification of important sections of British Railways under the modernisation plan were announced on January 16 by the British Transport Commission. The total value of these contracts is about £8 million. Details of contracts for electrical equipments are as follow:—

Metropolitan-Vickers Electrical Co. Ltd., Trafford Park: 91 sets of electrical equipments for multiple-unit train sets to operate on Glasgow surburban lines

British Thomson-Houston Co. Ltd., Rugby: 35 sets of electrical equipments for four-car multiple-unit train sets to operate on the Manchester-Crewe section

English Electric Co. Ltd., London, W.C.2: 112 sets of electrical equipments for four-car train sets to operate on the London-Tilbury-Southend section

General Electric Co. Ltd., London, W.C.2: 70 sets of electrical equipments for three-car train sets to operate on the Liverpool Street-Chingford-Enfield section.

Contracts for 25 kV single-phase 50-cycle electrification switchgear are as follow:—

ASEA Electric Limited, London, E.17: 25 sets of 300-mVA. circuit breaker equipments and 25 sets of 150-mVA. circuit breaker equipments

Switchgear & Cowans Limited, Manchester: 50 sets of 300-mVA. circuit breaker equipments and 50 sets of 150-mVA. circuit breaker equipments.

All the above-listed circuit breakers are for lineside installation on the Colchester-Clacton and Manchester-Crewe sections.

British Brown-Boveri Limited, London, S.W.1, has been awarded a contract for 250 sets of circuit breakers for multiple-unit train sets for installation on the Colchester-Clacton and Manchester-Crewe sections and other lines.

The B.T.C. has already announced the placing of contracts for the overhead line equipment for the electrification schemes between Manchester and Crewe, London Midland Region, and between Colchester and Clacton, Eastern Region.

An order for eight diesel-hydraulic locomotives for main line duties on the Sierra Leone Government Railway has been

received by Hudswell, Clark & Co., Ltd. Each of these locomotives is to be fitted with a Paxman diesel engine of the Hi-dyne (constant horse-power) type, together with a Vulcan-Sinclair dual fluidrive transmission unit. This type of locomotive has been developed by Hudswell, Clark & Co. Ltd., during the last four years, under the name "Enterprise." The prototype locomotive has undergone extensive trials, and this order results from its most successful performance. The value of the contract amounts to over £200,000. It was placed by the Crown Agents for Oversea Governments and Administrations, acting for and on behalf of the Government of Sierra Leone. Hudswell, Clarke & Co. Ltd. recently has supplied a number of other diesel locomotives for use on the Sierra Leone Railway.

London Transport announces the placing of a contract for the construction of a relay room at Kennington Station with Mitchell Bros. Sons & Company of Victoria Street, London, S.W.1. The value of the contract is £11,400.

British Railways, North Eastern Region, have placed the following contracts:—

Holman Bros. Limited, Sheffield: one Holman Tractair

H. Morfitt & Sons Limited, Leeds: central heating and hot water services, motive power depot, Ardsley

G. E. Taylor & Co. (London) Ltd., London: electrical installation, multiple-unit depot, Darlington

R. Gallacher Limited, Consett: new signalbox, Annfield Plain.

Ransomes, Sims & Jefferies Limited, Ipswich: four electric trucks with charging units, Carriage Works, York

Alley & MacLellan (Polmadie) Limited, Glasgow: compressed air facilities, Motive Power Depot, Thornaby

Wm. Latimer & Co. Ltd., Newcastle-upon-Tyne: cleaning and painting, Stooperdale Boiler Shop, Darlington

British Railways, Southern Region, have placed the following contracts:—

Richard Crittall & Co. Ltd., London, W.1: new boiler plant, electrical repair shed, Slade Green

Mould & Blaydon Limited, Ewell: heating installation, goods office, Guildford

Taylor Woodrow Construction Limited, Southall: construction of new diesel inspection shed, St. Leonards West Marina

Richard Crittall & Co. Ltd., London, W.1: installation of central heating boiler, sheet and rope factory, Nine Elms

The Demolition & Construction Co. Ltd., London, S.W.1: demolition of buildings and site clearance, New Cross Gate depot

Mould & Blaydon Limited, Ewell: installation of heating and hot water services, Nine Elms "A" shed

Szerelmey Limited, London, S.E.16: repairs to stonework, Exeter Central Station

Newalls Insulation Co. Ltd., Croydon: insulation of water supplies, carriage cleaning sheds, Gillingham, Kent

Geo. Wimpey & Co. Ltd., Hayes: soil surveys, South Eastern Area

Alfred Bagnall & Sons Ltd., London, W.12: renovations, Bricklayers Arms "L" shed

The Demolition & Construction Co. Ltd., London, S.W.1: new substations and track paralleling huts, Kent Coast electrification

Aubrey Watson Limited, London, S.W.1: platform extensions, Kent coast electrification

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from South Africa for carriage fittings as follows:—

79 items of carriage fittings including rubber gaskets, handles, hinges, hooks, locks, striking plates, pedal flush pans, taps and sash balance tapes.

The issuing authority is the Stores Department South African Railways. Bids in sealed envelopes, endorsed "Tender No. H.5859" should be addressed to:—The Chairman of the Tender Board, P.O. Box 7784, Johannesburg. The closing date is February 1, 1957.

A copy of the tender documents, but not drawings, is available for loan to United Kingdom firms on application. A photo-copy set can be purchased from the Branch (Lacon House, Theobalds Road, W.C.1.) for 13s. Cheques and postal orders should be made payable to the Principal Accountant, Board of Trade. Firms wishing to collect photo-copy sets of tender documents are advised to notify the Branch in advance of their requirements. Drawings may be inspected at the office of any S.A.R. Stores Superintendent, and at the Office of the Chief Stores Superintendent, Room 506, Park Chambers, Rissik Street, Johannesburg. Tenderers can obtain copies on application to any of the aforementioned offices, on payment of 1s. per print or £2 per set. The drawings may also be inspected at the Offices of the High Commissioner for the Union of South Africa, Trafalgar Square, London. The reference ESB31884/56 should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from South Africa for track jacks and mobile cranes as follows:—

(*a*) 600 track jacks, type "A" to spec. CCE 2/20-1956 (revised October, 1956) TEN/23388

(*b*) 2 self-propelled, mobile jib cranes, suitable for general lifting work in confined areas, in mechanical workshops. TEN/23389

The cranes must be designed, manufactured and tested, in accordance with British Standard No. 1757/1951—"Power-Driven Mobile Cranes," and full details of any departures must be furnished at the time of tendering.

The lifting capacity shall be: load 5 tons (11,200 lb.), outreach 3 ft. 5 in., height of lift 13 ft. 6 in. This load rating shall represent not more than 66⅔ per cent of the tipping load, i.e. 50 per cent minimum margin of stability. Arrangements should be made for the capacity load to be carried on four falls of steel wire rope, but lesser loads may be taken on either one or two falls. The outreach is to be taken as the horizontal distance from the centre line of the lifting hook to the nearest point on the front end of the chassis or the front wheels. Each undercarriage is to be mounted on at least four pneumatic tyred wheels.

The issuing authority is the Stores Department, South African Railways. Bids, in sealed envelopes, endorsed "Tender No. (*a*) A6381 Track Jacks, (*b*) F6322 Mobile Cranes," should be addressed to:—The Chairman of the Tender Board, South African Railways, P.O. Box 7784, Johannesburg.

The closing dates are (*a*) February 1, 1957, and (*b*) February 8, 1957.

Copies of the tender documents are available for loan to United Kingdom firms on application. Photo-copy sets can be purchased from the Branch (Lacon House, Theobalds Road, W.C.1) for (*a*) 9s., (*b*) 14s. Cheques and Postal Orders should be made payable to the Principal Accountant, Board of Trade. Firms wishing to collect photo-copy sets of tender documents are advised to notify the Branch in advance of their requirements. The reference (*a*) ESB 32137/56, (*b*) ESB 32138/56 should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from Pakistan for broad gauge rail tank wagons for liquefied anhydrous ammonia as follows:—

14 broad gauge (5 ft. 6 in.), 4-wheel rail tank wagons for liquefied anhydrous ammonia, complete with "U" frame wheels and axles, plain bearing axleboxes, vacuum brake fittings, draw and buffing gears in accordance with the enclosed particular specification in fully erected conditions

alternatively

14 same as above, but fitted with roller bearing axleboxes. One set of hand made tracings and two sets of mechanical tracings showing the work actually as made.

The issuing authority is the Ministry of Communications (Railway Division), Government of Pakistan. The tender No. is PRS-56/WAG/5/TDR. Bids should be addressed to the Director General (Railways), Railway Division, Ministry of Communications, Government of Pakistan, Karachi. Marked "Tender for 14 B.G. Rail Tank Wagons for Liquefied Anhydrous Ammonia." The closing date is March 4, 1957. A copy of the tender documents is available for loan to United Kingdom firms on application to the Branch (Lacon House, Theobalds Road, W.C.1.). A photo-copy set can be purchased from the Branch for 9s. Cheques and postal orders should be made payable to the Principal Accountant, Board of Trade. Firms wishing to collect photo-copy sets of tender documents are advised to notify the Branch in advance of their requirements. Local representation is essential. The Branch will, on request, supply a list of the local concerns who have expressed their willingness to act on behalf of United Kingdom firms. The reference No. E.S.B./32366/56 should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from Luxembourg for railway tipping trucks:—

20 tipping trucks with four or five compartments capable of tipping on both sides and permitting rapid loading directly on to lorries. Each compartment should have approximate capacities of 5 tons weight and 4·5 cu. m. volume

The issuing authority and the address to which bids should be sent is the Société Nationale des Chemins de Fer Luxem-

bourgeois, Groupe III, Division M (M21), 62, Rue de Bonnevoie, Luxembourg. The tender No. is MT VIII 2d No. 35/12M21. The closing date is February 4, 1957. A copy of the tender documents (in French) is available for loan to United Kingdom firms on application to the Branch (Lacon House, Theobalds Road, W.C.1). The reference ESB/32476/56 should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from Luxembourg for hopper railway wagons as follows:—

7 automatic discharge hopper wagons with one compressed air brake and one screw brake; two axles; weight per axle, 20 tons maximum; capacity, approx. 25 cu. m.

The issuing authority and the address to which bids should be sent is the Société Nationale des Chemins de Fer Luxembourgeois, Groupe III, Division M (M21), 62, Rue de Bonnevoie, Luxembourg. The tender No. is MT VIII 2d No. 36/12M21. The closing date is February 4, 1957. A copy of the tender documents (in French) is available for loan to United Kingdom firms on application to the Branch (Lacon House, Theobalds Road, W.C.1). The reference ESB/399/57 should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from Portuguese East Africa for luggage vans as follows:—

2 luggage vans for passenger trains
2 luggage vans for goods trains

The issuing authority is the Ports, Railways and Transport Department, Lourenço Marques. The tender No. is 10/57. A provisional deposit of Esc. 65,000$00 must be made by tenderers. The closing date is April 10, 1957.

A copy of the tender announcement (in Portuguese) is available for loan to United Kingdom firms on application to the Branch (Lacon House, Theobalds Road, W.C.1).

A photo-copy set can be purchased from the Branch for 1s. Cheques and postal orders should be made payable to the Principal Accountant, Board of Trade. Firms wishing to collect photo-copy sets of tender documents are advised to notify their requirements in advance. Drawings and specifications are obtainable from the Railway Warehouses at Lourenço Marques, through local agents of United Kingdom firms interested. United Kingdom firms cannot submit tenders direct but only through firms established in Mozambique whose names are registered with the Stores Department of the Treasury (Almoxarifado de Fazenda), Lourenço Marques. The Branch will, on request, supply the names of local concerns who have expressed their willingness to act on behalf of United Kingdom firms. The reference E.S.B./32498/56 should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from South Africa for speed indicators and electric cables as follows:—

700 sets speed indicator equipment, in accordance with S.A. specification No. L-131, comprising one a.c. generator complete, one wheel diameter adjustment box, complete with variable resistance, etc., one indicator, one flexible cable coupling, and one frame socket (if required)

14,000 ft. electric cable, in accordance with clause 7 of S.A. specification No. L-131 (tenderer to state in what lengths the cable will be supplied)

50 instruction books, in accordance with clause 8 of S.A. specification No. L-131

1 set hand made tracings, in accordance with clause 9 of S.A. specification No. L-131

1 set velographs of above

Spares as recommended by the tenderer. Tenderer to state price per item and quantity which it is recommended should be held to cover normal maintenance requirements for a period of two years

4 sets special tools for speed indicator components, in accordance with clause 11 of S.A. specification No. L-131

1 generator magnetising unit in accordance with clause 12 of S.A. specification No. L-131.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. C.6336: Speed Indicators," should be addressed to The Chairman of the Tender Board, South African Railways, P.O. Box 7784, Johannesburg. The closing date is March 15, 1957.

A copy of the tender documents is available for loan to United Kingdom firms on application to the Branch (Lacon House, Theobalds Road, W.C.1).

A photo-copy set can be purchased from the Branch for 16s. Cheques and postal orders should be made payable to the Principal Accountant, Board of Trade. Firms wishing to collect photo-copy sets of tender documents are advised to notify the Branch in advance of their requirements. The reference E.S.B. 32495/56 should be quoted in any correspondence with the Branch.

The Special Register Information Services Branch, Board of Trade, reports that the closing date of the call from Chile for flat 30-ton bogie wagons, reported on page 625 of our issue of November 23, 1956, has been indefinitely postponed.

The Special Register Information Services Branch, Board of Trade reports that the closing date of the call from Luxembourg for 160 covered railway wagons, reported on page 767 of our issue of December 28, 1956, has been extended to February 25, 1957.

The Director-General of Supplies & Disposals, New Delhi, invites tenders for the supply of lower bearing housings as follows :—

2,800 lower bearing housings to Drg No. T-5-2-008, altd (D.G.S. & D. No. 10333/2 approx. weight each 1 lb. rough cast) and to be made of sand castings Alufont 3B heat treated with min. ultimate tensile strength 20·3 to 23·5 tons/sq. in. proof stress (0·2 per cent) 14 to 16·5 tons/sq. in. elongation per cent L.11·3/ area: 3 to 7 per cent brinell hardness (10/500/30) 90-100 kg./sq. mm. impact value, Charpy 0·6.MKG/sq. cm.; fatigue bending stress 20×10^6 reverse $\pm$ (5·1-5·7) $\pm$ tons (sq. in.), alternatively to B.S. 1490 —L.M.11 W.P. to be supplied as cast without machining, but with excess material for machining, properly cleaned and free from burs and sand with clean smooth surface. All castings to be guaranteed against defects and breakages for one year from date of taking coach into regular service. An advance sample is required for approval before bulk supply is effected. Test certificate should accompany the supply.

Delivery is required, half by July 1, 1957, and the remainder by January 1, 1958. Tenderers should give the earliest date of delivery that they guarantee to adhere. The consignee is the Dy.C.O.S., Integral Coach Fy. Perambur, Madras-23. Tenderers should note that the stores required herein are to be supplied to an indentor who is a manufacturer and is entitled to manufacturer's discount. The address to which bids should be sent is the Director General of Supplies & Disposals (Section SRI), Shahjahan Road, New Delhi. The reference No. P/SRI/16680-G/1 shculd be quoted. The closing date is February 1, 1957.

Forms of tender are only available for purchase in India from : Deputy Director General (Supplies), Directorate General of Supplies & Disposals, New Delhi; Director of Supplies & Disposals, Bombay or Calcutta; Deputy Director of Supplies & Disposals, Madras. If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram provided always that all essential particulars are given and further provided they simultaneously apply for the tender forms and return them duly completed as soon as possible on the basis of advance quotations already submitted. A copy of the tender form can be examined at the India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, on application to the "CDN" Branch quoting reference No. S2673/56/Rly./BN. and the drawing can be seen at the office of Hodges Bennett & Company, 59/60, Petty France, Westminster, London, S.W.1, from whom copies may be obtained, if required, at a fixed price per sheet.

Notes and News

Company Secretary Required.—A company secretary, with expert knowledge of costing and estimating, is required by a railway engineering firm in Lancashire. See Official Notices on page 92.

Assistant Chief Draughtsman Required.—Applications are invited for the post of assistant chief draughtsman, with experience in design of steam and for diesel locomotives. See Official Notices on page 92.

C.P.R. Firemen's Strike.—The strike by 3,000 firemen of the Canadian Pacific Railway, referred to in our issue of January 4, began on January 2, and ended on January 11. The main issue, the employment of firemen on diesel locomotives in yards, has been referred to arbitration by a commission.

Electric Locomotives for Chile.—A report from Santiago, Chile, states that the Chilean State Railways were to consider bids for its electrification scheme between Santiago and Chillan last Tuesday. The contract is unlikely to be awarded for some time because of negotiations being carried on with the International Bank in

connection with financing the scheme. The scheme, which will cost some $25,000,000, includes the supply of 24 Co-Co locomotives of 3,600 h.p. and 22 Bo-Bo locomotives of 2,400 h.p. It is believed that all bidders for locomotives except the English Electric Co. Ltd. and an Italian consortium have been eliminated, and in view of the previous success of the British company in supplying locomotives to Brazil and the Argentine it is thought in Santiago that English Electric will be awarded the contract.

Beclawat Windows for Mozambique Coaches.—Beclawat Cyclone double-glazed unit windows have been supplied by Beckett, Laycock & Watkinson Limited for new coaches for the Mozambique Railways. The coaches, of the Budd stainless steel type, have been built by Sociedades Reunidas de Fabricaçôes Metállicas Limited (Sorefame), of Amadora, Portugal. They include special vehicles for the recent visit of the President of Portugal. The use of British leather in one of the coaches was referred to on page 219 of our issue of August 17, 1956.

British Railways Arts & Crafts Exhibition.—The awards for work shown at the second inter-Regional exhibition of arts and crafts of the British Railways Staff Association at Brunswick House, Wandsworth Road, Vauxhall, London, were presented on January 14 by Lady Wilson, wife of Sir Reginald Wilson, Member of the British Transport Commission and Chairman of the Eastern Area Board, who also attended. Owing to the indisposition of Sir Brian Robertson, Chairman of the Commission, Lady Robertson was unable to be present as arranged. The Eastern and London Midland Regions tied for the challenge shield awarded annually to the Region gaining the most points. The previous holders were the Southern Region. There were nearly 400 entries, all chosen from exhibits previously shown at Regional exhibitions.

Sentinel (Shrewsbury) Limited Dividend Deferred.—It is announced that the dividend on the 6 per cent cumulative preference shares of Sentinel (Shrewsbury) Limited, for the half year ended January 5, is deferred.

Increased Sale of Cheap Evening Return Tickets.—During the week ended January 5, London Transport sold 51,000 cheap evening return tickets at Underground stations, the highest weekly total since this cheap travel facility was introduced three years ago. Sales of these tickets have been increasing steadily since last summer.

Record Production of Leyland Engines in 1956.—To meet the heavy demands of the vehicle production line, as well as the growing orders for Leyland diesel engines placed by outside manufacturers, the engine factory of Leyland Motors Limited broke all its previous production records during 1956. The total of engines produced by the end of the financial year in September was more than 20 per cent greater than the total for the previous financial year which was itself a record figure. The increase was reflected in the delivery of vertical diesels of all types for installation in industrial plant and machinery, a market in which the company has enjoyed increasing business in recent years.

Coventry Gauge & Tool Co. Ltd.—The final ordinary dividend of Coventry Gauge & Tool Co. Ltd. is 4¾ per cent, making 6¼ per cent, tax free, for the year ended August 31 (the same as for 1954-55). Net profits rose to £162,027 from £148,728 after tax of £194,529 (£187,780).

Leyland Orders from B.T.C. Total £1,000,000 in 1956.—A series of repeat orders which reached a total value of more than £1,000,000 was placed with Leyland Motors Limited by the British Transport Commission during 1956. The vehicles ordered will augment the British Road Services fleet which already includes more than 1,000 Leylands supplied to B.R.S. in recent years. Although the bulk of the new Leyland vehicles originally introduced into the B.R.S. fleet were Octopus eight-wheelers, most of the recent orders have specified Comet and Beaver tractors for use with semi-trailers.

Film of Metal Pretreatment Processes.—A film has been produced by Imperial Chemical Industries Limited, entitled "I.C.I. Metal Pretreatments in Industry," which focusses attention on the importance of pretreatment processes in widely differing types of industry, and features the various metal-surface preparation methods developed by the company. These include the Granodine phosphating, the Deoxidine, rust-removal, and the Alocrom aluminium protection processes which the company has developed. Details of arrangements for the hire of the film may be obtained from the company's nearest area office.

Increased Anglo-Irish Travel by L.M. Region Services.—A big increase last year in travel to and from Ireland is reported by the London Midland Region. There were nearly 420,000 passengers from Holyhead to Dun Laoghaire, compared with 377,000 in 1955, while in the opposite direction 434,000 travelled in 1956 and 398,000 in the preceding year. Carryings by the Heysham-Belfast service also increased. From Heysham, some 200,000 passengers crossed to Belfast, against 190,000 in 1955, while from Belfast the figures are 217,000 and 197,000 respectively.

Keith Blackman P.V.C. Fans for Corrosive Fumes.—Keith Blackman Limited, Tottenham, N.17, announces that production of the Series 1 range of fans made from P.V.C. material has now commenced. These fans are suitable for handling a wide range of actively corrosive chemical fumes at temperatures up to 120 deg. F. The capacity of this range is 50 to 180 c.f.m. at pressures up to 1·25 in./w.g., the fans being driven direct by totally enclosed motors wound for 400-440 V., 50 C., 3-phase supply, and the direction of discharge can be varied to suit any one of the standard directions except the less common vertical discharge.

Attempts to Block Track at Clapton.—The 12.1 a.m. train from Chingford to Liverpool Street on January 12 hit a 6-ft. length of rail which had been placed on the track at the approach to Clapton

British Transport Waterways at the National Boat Show

The British Transport Waterways stand at the recent National Boat Show at Olympia, London. The exhibits included a model of a new canal depot near Leeds, on the Aire & Calder Navigation

station. The locomotive pushed the rail before it on the wheel guards into the station. Little damage was caused, but investigation showed that another short length of rail and some pieces of light timber had also been placed on or near the track. On the same day, in the evening, the brakes of a lorry loaded with 5 tons of coal were released. The lorry was standing on a slight slope above Clapton goods yard, and it ran backwards towards the railway line, breaking through a fence and coming to rest on a bank. On January 13 a ganger found a piece of a concrete post and part of a concrete cable duct cover beside the line near the point where the rails had been found the day before. The civil and B.T.C. police are investigating the incidents.

Rubber Improvement Limited.—At the extraordinary general meeting of Rubber Improvement Limited held on December 31, 1956, the resolution sub-dividing the company's ordinary and "A" ordinary shares into denominations of 2s. and for the capitalisation of the sum of £50,996 15s., being part of the company's reserve, referred to on page 770 of our December 28 issue, was passed unanimously.

Butler Machine Tool Co. Ltd.—Mr. J. W. Butler, Chairman of the Butler Machine Tool Co. Ltd., states that the order book is very full, and the company is compelled to quote long deliveries for some of the products. This, he points out, is particularly regrettable in the export market, where the company has to struggle against import restrictions and the growing competition of the home manufacturer. In spite of these difficulties the value of orders on hand for export can be considered to be a satisfactory figure.

East Kent Road Car Co. Ltd.—At the annual general meeting of the East Kent Road Car Co. Ltd. on December 28, Mr. R. P. Beddow, Chairman, who presided, referred to further increased costs of materials and supplies such as tyres. The operations on the coach/air services between London and Paris have shown a healthy growth. The arrangements under which the company interchanges passengers with Belgian Marine and the Europabus services on the Continent are resulting, it is reported, in a satisfactory two-way flow of traffic, and the company has been successful in enlarging the scope of its own Continental tours.

Railway Marine Services.—Besides the Amingaon-Pandu service referred to on page 724 of our issue of December 21, 1956, an important wagon ferry in the Republic of India is that for metre-gauge wagons of the North Eastern Railway across the Ganges between Mokameh, on the right, or south bank, and Semaria, on the north. This is being replaced by the new bridge now under construction, which will carry a 5-ft. 6-in. gauge track and a roadway. Accordingly transhipment between the broad-gauge Eastern and metre-gauge North Eastern wagons will eventually take place on the north, instead of the south bank.

Royal Society of Arts Prizes.—The Royal Society of Arts, as trustee for the endowments concerned, offers during 1957 the Howard Prize of £50 for mechanical motive power and the Fothergill Prize of £20 for fire prevention or fire-fighting. The Howard Trust was established in 1868 for the purpose of making awards periodically to the authors of treatises on steam or other motive agents, and the prize will be awarded to the author of a treatise on some aspect of the subject of motive agents. Under the Fothergill Trust, established by the Will of Dr. Fothergill in 1821, a prize is offered for a descriptive essay or model embodying some new idea for the prevention or suppression of fire. Entries for the prizes must be received by the Secretary of the Royal Society of Arts, 6/8, John Adam Street, Adelphi, London, W.C.2, from whom full particulars may be obtained, not later than July 3, 1957.

Institution of Chemical Engineers New Premises.—The Institution of Chemical Engineers has moved into new premises at 16, Belgrave Square, S.W.1. Mr. J. A. Oriel, the President, referred at the recent inauguration of the new premises to the shortage of trained technologists in Britain, and stated that the Institution was doing its best to remedy this in its own field while ensuring that there was no diminution in the standards of its examinations.

Toledo Woodhead Springs Limited.—At the annual general meeting held on December 31, 1956, the Chairman, Mr. Frank Woodhead, announced a record trading profit of £128,799 for the year 1956. He stated that the improvement in turnover had extended to all sections of the company and had been pronounced in sales to hard currency areas. Revenue reserves and undistributed profits rose to £171,126 (£160,049), although £32,989 was capitalised and applied towards paying up shares in full. It was felt advisable to recommend a 15 per cent distribution as for last year; the report and recommendations were approved.

Ceylon Government Stores Department Request for Catalogues.—Ceylon is receiving assistance from the International Co-operation Administration in the development of the country's economy. To assist identification of equipment needed in these projects, the Government Stores Department is building up a catalogue library and would like to receive from United Kingdom manufacturers' catalogues and descriptive literature on, inter alia, railway equipment and industrial machinery. United Kingdom firms are asked to send literature to: Mr. L. A. Wijesinghe, Superintendent of Stores, Government Stores Department, Ministry of Finance, Colombo, Ceylon.

"C"-Licensees to Share Loads.—A scheme, known as "Operation Share-Load," is being organised by Mr. R. E. G. Brown, London Secretary of the Traders' Road Transport Association, to enable firms which are members of the Association to share loads to make better use of basic petrol and fuel-oil allocations. Mr. Brown has received permission from the Regional Transport Commissioners for the Metropolitan Area and the South-Eastern Traffic Area for firms with "C"-licence vehicles licensed in those areas to carry in their vans and lorries the goods of fellow-member firms. Member-firms have been asked to give details of when and where vehicles will be running; loading space available; carrying capacity; type of vehicle, and the kind of goods transported. These details are used to organise return loads.

Steel and Pig Iron Production.—Steel production in 1956 totalled 20·66 million tons, the highest level yet achieved, and 4·4 per cent higher than in 1955. It had been hoped that production last year would reach 21·3 million tons, but this was prevented mainly by the loss of output resulting from the craftsmen's ban on overtime. Production in December averaged 395,900 tons a week, 14,000 tons more than the weekly average in December, 1955, and in the first three weeks slightly above that for November, 1956. This has been achieved despite the reduction in oil supplies since early November. It would normally be expected that the rate would continue to increase throughout 1957 but this will depend on there being no further cut in oil deliveries. In 1956, pig iron production reached 13·17 million tons, an increase of 5·6 per cent on the 1955 production of 12·47 million tons.

Park Royal Vehicles Limited.—A 6 per cent tax-free dividend, against nil, on ordinary stock is proposed by the directors of Park Royal Vehicles Limited for the year ended September 30, 1956. After all charges, including tax of £54,789 (£30,039), group net profit is £51,665 (£23,364). Preference dividend absorbs £11,500 (£11,250) and the equity dividend £28,500, carrying forward £551,890 (£540,225). Associated Commercial Vehicles Limited acquired the £475,000 ordinary stock in May, 1949.

Forthcoming Meetings

Open currently and until further notice.—British Transport Commission: Historical Exhibition "Transport Treasures" in Shareholders' Meeting Room, Euston Station, from 10 a.m. to 6 p.m. on weekdays, and 2 to 6 p.m. on Sundays. Admission 6d.

January 19 (*Sat.*).—Stephenson Locomotive Society, North Eastern area, at the Griffin Hotel, Leeds, at 6.30 p.m. Paper on "Locomotives of the Caledonian Railway," by Mr. A. J. Thorn.

January 21 (*Mon.*).—At the Dorchester Hotel, Park Lane, W.1, (Ballroom entrance), at 12.30 for 1 p.m. luncheon in honour of Mr. R. H. Hacker, Chief Officer (Continental), B.R. Central Staff, on his retirement.

January 22 (*Tue.*).—Institute of Transport, Leeds & District Graduate & Student Society, at the Leeds City Transport Department, 1, Swinegate, at 7 p.m. Paper on "Some ideas on the future rail traffic pattern in the North Eastern Region," by Mr. F. L. Hick.

January 22 (*Tue.*).—Institute of Transport, Metropolitan Graduate & Student Society, at 80, Portland Place, London, W.1., at 5.45 to 6.15 p.m. Paper on "Transport in the planned economy—the post-war experiment in Poland," by Mr. B. Brodzinski.

January 22 (*Tue.*).—Stephenson Locomotive Society, Midlands area, at 64, Holyhead Road, Coventry, at 7.30 p.m. Lantern slide miscellany, by Mr. F. M. Carrier.

January 23 (*Wed.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1., at 5.30 p.m. Paper on "Diesel locomotive building and maintenance," by Mr. T. F. B. Simpson.

January 25 (*Fri.*).—Institution of Railway Signal Engineers, Bristol Section, in the Meeting Room above Main Booking Hall, Temple Meads Station, at 5.30 p.m. Paper on "Automatic train control," by Mr. J. H. Currey.

January 26 (*Sat.*).—Permanent Way Institution. Conversazione at 222, Marylebone Road, London, N.W.1., at 5.30 for 6 p.m.

January 26 (*Sat.*).—Railway Correspondence & Travel Society, Sussex & Kent Branch, at the Railway Hotel, Brighton, at 7 p.m. Paper on "Control on the Southern Region," by Mr. B. J. Holden. Also film show.

January 26 (*Sat.*).—Stephenson Locomotive Society, Liverpool Centre, in the Conference Room, Central Station, at 7.30 p.m. Paper on "A signalman's viewpoint," by Mr. Norman Marlow.

January 29 (*Tue.*).—Railway Correspondence & Travel Society, Leeds & West Riding Branch, at the Talbot Hotel, Kirkgate, Bradford, 1, at 7.30 p.m. Paper on "Railway electrification," by Mr. G. W. Carter.

January 29 (*Tue.*).—Railway Correspondence & Travel Society, East Midlands Branch, at the H.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. Mr. J. F. Henton will present colour shots taken during 1956.

January 30 (*Wed.*).—Stephenson Locomotive Society, Midland Area, at the Birmingham Exhibition & Engineering Centre, at 7.15 p.m. Annual meeting and colour slide show: "A recent World tour," by Mr. J. C. Wilkins.

February 1 (*Fri.*).—Permanent Way Institution, Manchester & Liverpool Section, in the Everton Room, Exchange Hotel, Liverpool, at 7 p.m. Talk on "Relaying problems affecting signal engineers' and permanent way engineers' departments," by Mr. F. W. Young. Combined meeting with the Signal & Telegraph Society, Liverpool Branch.

February 1 (*Fri.*).—The Railway Club, at 57, Fetter Lane, London, E.C.4, at 7 p.m. Annual general meeting (members only), followed, if time permits, by a display of coloured transparencies by Mr. G. W. Powell.

February 2 (*Sat.*).—Railway Correspondence & Travel Society, South of England Branch, at the Y.M.C.A. Library, Friar Street, Reading, at 6.30 p.m. Paper on "Railway accidents," by Mr. L. B. Shepard.

February 4 (*Mon.*).—Historical Model Railway Society, at the headquarters of the Stephenson Locomotive Society, 32, Russell Road, London, W.14, at 7 p.m. Talk on "Leek & Manifold Valley Light Railway," by Dr. J. R. Follick.

February 5 (*Tue.*).—South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, at the Angel Hotel, Westgate Street, Cardiff, at 6.30 p.m. Debate with British Railways, Bristol, Lecture & Debating Society.

February 5 (*Tue.*).—Institute of Transport, at the Connaught Rooms, Great Queen Street, London, W.C.2, at 12.30 for 1 p.m. Informal luncheon, principal guest Major-General Sir Reginald Kerr.

February 5 (*Tue.*).—Permanent Way Institution, Leeds & Bradford Section, in the British Railways Social & Recreation Club, Ellis Court, Leeds City North Station, at 7 p.m. Paper on "Mechanised relaying in a single-line tunnel," illustrated by lantern slides, by Mr. F. Everitt.

February 5 (*Tue.*).—Stephenson Locomotive Society, North Eastern Area, at the Conservative Association Rooms, 2, Jesmond Road, Newcastle-upon-Tyne, 2, at 7 p.m. Paper on "A museum for transport," illustrated by lantern slides, by Mr. J. H. Scholes.

February 5 (*Tue.*).—Institution of Mechanical Engineers, Applied Mechanics Group Discussion, at 1, Birdcage Walk, Westminster, London, S.W.1, at 6.45 p.m., on "Locking devices and the prevention of loosening of components."

Railway Stock Market

The list of ministers in the new Macmillan Government created a good impression in the City, where the upward trend of values was continued, both in British Fund and industrial shares. This is a reflection of the prevailing view that the new Chancellor of the Exchequer will favour a reduction in the Bank rate. In fact it continues to be widely assumed that the rate will be reduced from 5½ per cent to 5 per cent in the near future, and that if all goes well, a bigger reduction is a probability after the Budget. Sentiment in the City has also been helped by the belief that the new Government should deal successfully with major international and economic problems. It is clear from the latest company news that in many industries, rising costs have been accentuated by the advance in oil and petrol prices, and that in general, profits are running at lower levels. Nevertheless, it is widely believed the majority of dividends should be maintained, though on the other hand, it is reasonable to suppose that increases will be an exception. There are optimistic hopes that by the end of the year the bank rate may have been reduced to 4 per cent, but on the other hand, the existing credit squeeze by the banks, it seems, will have to be continued until inflation ceases to be a danger.

Canadian Pacifics have strengthened to $65¼ since the ending of the strike. The yield on the basis of last year's dividend is 5 per cent, which is not unattractive for a share which offers one of the promising means by which an investor can acquire a financial interest in the future of Canada. The special payment recently announced, is not of course regarded as the last special payment which shareholders can expect from the non-railway investments of the group, the return from which should expand substantially in the years ahead. The £57½xd Canadian Pacific 5 per cent non-cumulative preference stock yields nearly 7 per cent, and the 4 per cent debentures at £67¼ yield over 5¾ per cent. White Pass shares have eased to $19½ which compares with $20¼ a week ago. In other directions Peru Transport $1 shares at $1⅛ yield 8¾ per cent.

United of Havana stocks have been active on calculations showing that their remaining liquidation payments, if all goes well, should be over 11 for the second income stock, which is now quoted at 7¾ and up to 3 for the consolidated stock which is now quoted at 2¾. Antofagasta stocks were also active, partly because of the good yields ranging up to over 12¼ per cent on the ordinary stock, which at 32 compares with 32¼ a week ago. The preference stock, which yields over 11 per cent was 45, compared with 46 a week ago. Mexican Central Railway "A" bearer debentures have changed hands around 71½.

In other directions, San Paulo Railway 3s. units were 3s. 4½d. Nitrate Rails shares were 20s. and Taltal Railway shares 12s. Costa Rica ordinary stock showed a number of dealings around 23 and the 6½ per cent first debentures were 75xd. United of Yucatan bonds again attracted some attention and changed hands at 14½. Elsewhere, Wolmar Railway 4½ per cent bonds were 20½. Paraguay Central prior debentures were 15 and the "A" debentures marked 8.

Among Indian stocks, West of India Portuguese stock changed hands up to 52. Midland Railway of Western Australia stock was 8½, and business at 17 was recorded in the 4 per cent debentures.

Beyer Peacock showed steadiness at 34s. and Charles Roberts 5s. shares have been firm at 11s. 6d. Hurst Nelson eased to 37s. North British Locomotive were 11s. and Birmingham Carriage shares 15s. 6d. Gloucester Wagon 18s. shares have been dealt in around 11s. 10½d. and Wagon Repairs 5s. shares around 11s. 3d. G. D. Peters shares were, as usual firmly held and quoted at 23s. 9d. Westinghouse Brake at 75s. were firm on further consideration of the financial results.

The appointment of Sir Percy Mills, a leading industrialist, to the new post of Minister of Power created an excellent impression in the City. Shares of companies with interests in the development of atomic energy, including those of leading electrical equipment companies, and also steel shares, responded to the news. Associated Electrical were 67s. 3d., General Electric 54s. 3d. and English Electric 48s. 6d. Babcock & Wilcox were 72s. 3d., Vickers 42s. and T. W. Ward 65s. 6d. Tube Investments were 59s. 3d. and Ruston & Hornsby 27s. 3d. Among steel shares, there was a better tendency with Stewarts and Lloyds 57s. 3d. and United Steel were 31s. 6d. "ex" rights to the new shares which were quoted at 2s. premium over the 30s. at which they are offered to shareholders. Imperial Chemical new 5½ per cent loan stock, one of the largest and most successful issues ever made, was at a big premium which touched £7⅛ at one time

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